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Journal of Glenn T. Seaborg, 1945-1960. Appendix: Press Clippings

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Publication Date

1995

PUB-756
January 1995

JOURNAL OF
GLENN T. SEABORG
1945 - 1960

Appendix
Press Clippings

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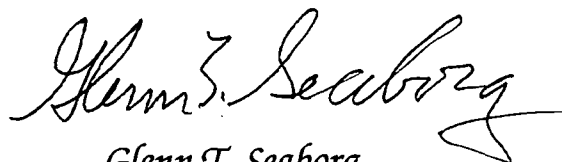
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JOURNAL
OF
GLENN T. SEABORG
1945 - 1960

Appendix
Press Clippings

This work was supported by the U.S. Department of Energy
under Contract DE-AC03-76SF00098.

This book contains a limited sampling of press clippings from 1945 to 1960. A selection of press clippings 1961-1971 has also been produced as Lawrence Berkeley Laboratory PUB-625: Journal of Glenn T. Seaborg: Appendix (December 1989). Many of these press clippings describe significant events in my career. The reader may be interested in reading about these events in more detail. I have kept a daily diary since I was 14 years old (1927) and my diary has been printed by Lawrence Berkeley Laboratory and is available here, and at the Bancroft Library of the University of California at Berkeley, the University of California at Los Angeles Main Library, the University of California at Santa Barbara, the National Archives, and the Library of Congress.



Glenn T. Seaborg

December 1994

Lawrence Berkeley Laboratory

Berkeley, CA

U. C. Helped to End War, Ensure Peace Atom Bomb History Told

Dr. Deutsch Tells Of Work Here On Project

"The Nation is in debt to the University of California for its vital contributions to the early end of the war, and the world for means to end all wars," said Dr. Monroe E. Deutsch, provost and vice-president of the University of California, speaking of the contribution of Dr. Ernest O. Lawrence and the University of California men to the development of the atomic bomb.

At a meeting of the regents of the University, Dr. Lawrence told the part which the University of California group had played in the development of the bomb. His talk followed closely the report of Dr. H. D. Smyth, professor of physics at Princeton, which revealed the major role played by California men in cooperation with other leading scientists.

TWO TASKS

The making of the atomic bomb involved two principal tasks. Dr. Lawrence pointed out—the production of materials rich in atoms which would split to give off energy, and the incorporation of these materials into a bomb which could be transported to the war front and detonated at the proper time and place. In both these tasks the University men had a prominent part. These men included not only scientists originally connected with the Radiation Laboratory but professors of physics, engineering, chemistry, mathematics, agriculture, paleontology and philosophy, he said.

As early as 1939 all the prerequisites for an attack on the problem of using atomic power were at hand, it was revealed. The cyclotron, which had been invented at the University of California, had proved to be the foremost tool in scientific study of the structure of the atom, and cyclotrons had been constructed in research centers in many countries, including Japan. This instrument led to advancement in knowledge of the atom and the technique of breaking it, and hence contributed greatly to the development of the atomic bomb.

U. C. MEN FIRST

It was generally known, both in the United States and abroad that the isotope of uranium, U-235, would split under neutron bombardment and give off energy. University of California research men, working with the cyclotron on the Berkeley campus had been among the first to verify this fact when it was flashed to a waiting scientific world.

It was soon shown that these splitting U-235 atoms gave off more neutrons which in turn might act as triggers to cause other atoms to split, thus providing what is known as a chain reaction. However the Smyth report points out that the gap between producing a chain reaction and using it is comparable to the gap between the discovery of fire and the manufacture of a steam locomotive.

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Work in the Radiation Laboratory at Berkeley and in the chemistry department was progressing steadily before the war, it was revealed. Two new elements beyond uranium in the periodic table were discovered in the products of the cyclotron. The first of the new elements, number 93 was named neptunium, and was credited to Dr. Edwin M. McMillan associate professor of physics, and Philip H. Abelson, former graduate student under Dr. Lawrence. The second, number 94 on the periodic table, and called plutonium, was officially isolated by a graduate student, Arthur C. Wahl, Jr., working un-

der the direction of Prof. Glenn T. Seaborg, and with assistance from Dr. Joseph W. Kennedy, instructor. Subsequent study of the new elements was done by the group with the help of Dr. Emilio Segre, research associate, and Dr. Seaborg. It was found that plutonium, like uranium 235, split under neutron bombardment, also gave off neutrons, and presumably would form a chain reaction.

REPORTS TO ACADEMY

In a report to the National Academy in May, 1941, Dr. Lawrence stated that plutonium had been discovered at the University, that it underwent slow neutron fission behaving like uranium 235. He pointed out that it probably not only could be exploded by a fast chain reaction to produce a super bomb, but that it could be made by a slow or controlled chain reaction in unseparated uranium isotopes, an "outstanding possibility."

This suggestion was subsequently carried out by the University of Chicago group under Dr. A. H. Compton and culminated in the big DuPont plant at Richland, Wash., where plutonium is being manufactured in quantity for the making of atomic bombs.

The Berkeley group had not confined itself to plutonium, but had also continued work on uranium 235, which occurs in uranium as a minor constituent, only one part in 140. As a result of their investigation they announced at the end of 1941 that they could electromagnetically separate uranium 235. In this process, the uranium particles are electrically charged, and fired through a huge electromagnet which sends them in a curving course. The lighter U-235 are bent more from the straight course and thus can be trapped separately from the other parts of uranium which are discarded.

MAJOR ACCOMPLISHMENT

Development of this process became one of the major accomplishments at Berkeley, and resulted eventually in large-scale separation of uranium 235 in a plant in the Tennessee Valley. In the beginning, the 37-inch cyclotron magnet was adapted for use on the separation. Later, the largest magnet in the world, which had been intended for a giant new cyclotron,

was also used in the process. A great number of men helped in this development, and many designs were tried; more than 70 different types of sources and a hundred receivers were constructed and tested. There were five separator units in the big magnet building at Berkeley which were available simultaneously for experimenting, pilot plant trials, and training of operators for the proposed factory. The Tennessee plant for the separation of uranium 235 by this process was constructed and assembled by the Stone and Webster Engineering Company; Westinghouse Electric and Manufacturing Company made the mechanical parts; General Electric Company furnished the electric equipment and controls; the Allis-Chalmers Company manufactured the magnets; and the Tennessee Eastman Company was in charge of the operation of the plant. Scientists from Berkeley acted in an advisory capacity to assist in solving problems as they arose. This electromagnetic plant was the first to produce quantities of uranium 235, and for nearly a year it was the only one in operation.

OTHER SCIENTISTS

Among the scientists who worked with Dr. Lawrence from the beginning were Dr. Donald Cooksey and Dr. J. Robert Oppenheimer. Dr. Cooksey was responsible for the fabrication of the cyclotron, and has served as assistant director and associated director of the Radiation Laboratory. Dr. Oppenheimer, professor of physics on the Berkeley campus, was later to head the group which developed the atomic bomb. Others in the group originally at Berkeley were Dean M. P. O'Brien, who served as executive engineer, William Brobeck, assistant director in charge of engineering design, Dr. F. A. Jenkins, professor of physics, Dr. Frank Oppenheimer, physicist, W. B. Reynolds, engineer, Dr. R. L. Thornton, physicist, Dr. A. C. Helmholtz, assistant professor of physics, Dr. J. G. Backus, and Dr. Bernard Peters, research associates, Dr. Theodore Finkelstein, Dr. L. P. Smith, and Dr. W. E. Parkins, Jr., from Cornell, Dr. J. R. Richardson, physicist and former student of Dr. Lawrence, Dr. E. U. Condon and Dr. J. J. Stepian from Westinghouse, and Dr. Irving Langmuir and Dr. K. H. Kingdon from General Electric.

The work was also greatly aided by the assistance of a group of distinguished English scientists, headed by Dr. M. L. Oliphant and Dr. H. G. W. Massey.

The Smyth report points out that the responsibility for the factory was divided between six major groups. The Radiation Laboratory at the University of California did the research and development and worked with the five commercial companies.

LAST STAGE OF TASK

The last stage of the work, the development of the atomic bomb, was under Dr. J. R. Oppenheimer. In the summer of 1942 he gathered a group together for experiments and further theoretical investigation. Working on top a mountain at Los Alamos, New Mexico, he headed a large group, headed by the Smyth report, an extraordinary galaxy of scientific stars. Even the task of assembling the necessary apparatus was enormous. The development of the bomb itself was fraught with unknown hazards and blocked by difficulties. Chief of these latter was the almost total absence of materials from which the bombs were to be made, and the impossibility of making any models on a small scale since no explosion at all occurs until the critical size is reached. Thus the final test was a triumph of almost pure theoretical reasoning plus experimental measurements on infinitesimal amounts of materials.

Theory of the atomic fission explosion, which was to utilize either plutonium or uranium 235, warned that no chain reaction would take place until the assembled material had reached a certain critical size and shape. When it did, however, there would be no way to prevent the cataclysm. Thus the bomb was to be manufactured in several small pieces which would be shielded from stray neutrons with heavy tamper material. To produce detonation the parts must be brought together rapidly and held together with the heavy material until the explosion was well started.

TEST THEORIES

The scientists were so convinced that their theories would work out in practical fashion that the whole of the program was completed before one test bomb was tried. Even the Smyth report was written previously, and states that all

Both the report by Dr. Smyth and the discussion by Dr. Lawrence emphasize that the possible uses of nuclear energy are not all destructive. The second direction may be expected to take place along the paths of peace, principally along the lines of nuclear energy for power and the use of radioactive by-products for scientific, medical, and industrial purposes. Scientists seem to agree that a great industry will grow out of these first beginnings, but there is little agreement as to the rapidity of the rise. There is no immediate prospect of running cars with nuclear energy, the report predicts. There is a good probability that nuclear power for special purposes can be developed within 10 years, and the plentiful supplies of radioactive materials can have a profound effect on scientific research and perhaps on the treatment of certain diseases in a similar period.

A new tool for mankind has been created, Dr. Lawrence pointed out. The scientists who have

worked in the project have done so as citizens of the United States but also as men vitally interested in the welfare of the human race.

the problems being finally solved, at least well enough to make a bomb practical, the scientific world was only waiting from day to day to hear the noise of the first explosion.

RADIO

Atomic ABCs

Quiz Kids' Grasp of Complexities Would Do Credit to Congressmen

By HARRIET VAN HORNE

If it were within my province to choose, I'd leave the atomic bomb and its attendant matters (among them, my destiny) to the Quiz Kids rather than entrust it to some of the quiet minds along the Potomac.

For on last night's program, over ABC, these erudite moppets showed an admirable grasp of atomic fission, and its life and death import. They asked questions that Congressmen should be asking, as they legislate the better world.

Guest of the Quiz Kids was one of the scientists



Harriet Van Horne.

who worked on the atomic bomb, Dr. Glen Seeborg of the University of Chicago. He answered, simply and directly, the questions put to him by the junior experts. Yet one felt that his simplification was aimed more at the audience

than at his interrogators.

First off, the Kids wanted to know how many ways an atomic bomb could be dropped. Dr. Seeborg cited planes, V-2 rockets and the like. He also said that a bomb might be disassembled, carried in a suitcase, and be set to explode in anybody's backyard, with the aid of a time device. "If this should ever happen it would be a world catastrophe," he said solemnly.

In answer to another question, Dr. Seeborg said it would take 15 years to harness atomic energy for practical purposes.

Then one of the Quiz Kids wanted to know: Will keeping our atomic research a secret hold back the world scientifically?

"There is no fundamental secret," said Dr. Seeborg. Other countries know the basic secret, he feels sure, and in time all will be able to make atomic bombs of their own. In view of this, secrecy is short-sighted, since it breeds suspicion.

Moreover, said the physicist, restrictions placed on scientists who depend on free exchange of ideas to advance their own experiments will hold everybody back, including ourselves.

One of the older boys on the panel wanted to know if successful production of the atomic bomb represented a full realization of the Einstein equation for energy. Dr. Seeborg said no, and after the program he probably told the young man precisely why. Such talk, admittedly, is too technical for the average listener. And, anyway, it was time to hear about stomach distress.

The Quiz Kids are so smart they sometimes embarrass their quiz master, Joe Kelly. Mr. Kelly has the answers written on a card and if the kids deviate from what's written there—and insist they speak—Mr. Kelly feels a little like the village idiot.

One of the questions recently concerned the name of Christopher Columbus' wife, a lady who rarely gets billing in history books.

Joel Kupperman, 7, said her name was Felippa, but she wasn't the only wife. Columbus was married twice, he insisted. Mr. Kelly consulted his answer card and said he thought not. Said Joel: "He must have been married twice because I read that a woman named Beatriz had a son named Ferdinand and Christopher Columbus was the father." This statement Mr. Kelly decided to let pass unchallenged. But he looked it up later. Naturally, little Joel was right. A son was born to Beatriz and Christopher—but without benefit of clergy.

How radio loves to take bows.

After Saturday night's opening of "Are You with It?" the chief topic of conversation was Lew Parker, who gives the funniest performance in the show. He was

a new face to some neatergoers, but he is no newcomer to show business. Saturday night's triumph is the result of years spent in vaudeville and night clubs.

Lew has been a chorus boy, a comic, a singer, a hooper. He played small towns and big towns and spent more than a year touring the Pacific under hazardous conditions. Recently he has been on the air over WOR-Mutual. But when somebody inquired about his background Saturday night, a man whose only connection with show business is radio advertising, said proudly, "Why, he's a product of radio!"

OAKLAND TRIBUNE

U.C. Men Find 2 8/15/45 New Elements

University of California scientists today were credited with the discovery of two new elements, Nos. 93 and 94, one of which was a prime factor in the development of the atomic bomb.

One of the elements, plutonium, No. 94, on the periodic table, and the one used in the war-winning atomic bomb, was the discovery of Arthur D. Wahl Jr., 27, of Des Moines, while working as a graduate student at the university.

Wahl now is associated with Dr. J. Robert Oppenheimer, credited with much of the bomb's development, at Santa Fe, N.M., Government establishment.

Neptunium, No. 93, was located in the research of Dr. Edwin McMillan, associate professor of physics at the university, who obtained it experimentally.

Wahl and those who worked with him earned for chemists a measure of the glory for the development of the bomb, heretofore credited to physicists, by their important discovery, university officials said.

Wahl worked under direction of Glenn Seaborg, who was raised to a full professorship at the University because of its success, and Dr. Joseph W. Kennedy, instructor.

The plutonium project was continued on a large scale at the College of Chemistry, although Professor Seaborg, at the invitation of the University of Chicago went there to join in the development phase of the work.

This entire project culminated in the establishment of the big DuPont Plant at Richland, Washington, where plutonium is manufactured in quantities for the making of atomic bombs.

The element plutonium is so rare that at the end of 1942 only 500 micrograms, less than the head of a pin, had been produced.

Either plutonium or uranium-235 can be used as the explosive for atomic energy and probably both will be utilized, scientists said.

Dr. John H. Lawrence, head of the University's new division of medical physics and brother of Dr. Ernest O. Lawrence, Nobel-prize winning physicist whose cyclotron aided immeasurably in making the bomb possible, said that its cyclotrons would be used to open vast fields in the treatment of disease by means of artificial radioactivity.

Nature of the elements, previously kept as a war secret, was not announced in the Government-sponsored news but they are both products of uranium, vital element in the bomb.

DISCOVERY OF ELEMENTS 95 AND 96 ANNOUNCED AT CHICAGO ACS CONFERENCE

THE discovery of elements 95 and 96 was announced by Glenn T. Seaborg at the all-day Technical Conference of the Chicago Section of the ACS at Northwestern University, November 16. Speaking on chemical and radioactive properties of the heavy elements, Dr. Seaborg, professor of chemistry at the University of California, now working at the Metallurgical Laboratory of the University of Chicago, reported the results of many investigators who had collaborated on nuclear research during the war. The discovery of the new elements followed a hypothesis that elements at end of the periodic table form a second rare earth series starting with actinium.

Study on a tracer-scale of the first two transuranium elements, neptunium and plutonium, indicated that they were more stable in the lower oxidation states, as had been observed in the case of several of the elements immediately below uranium in the periodic table. The availability of larger amounts of these two elements from the Clinton and Hanford plants permitted intensive investigations of their chemical properties. Studies by several groups showed that they were similar in chemical properties to uranium with a tendency toward increasing stability of the plus three oxidation state in going toward plutonium.

The elements 90 to 94 lie in corresponding positions just below the sixth

period transition elements hafnium to osmium. But while the first members of this group (thorium and protoactinium) show a great resemblance in chemical properties to the first members in the hafnium transition series, the latter members (neptunium and plutonium) show practically no resemblance to rhenium and osmium. This suggests, said Dr. Seaborg, that it is an inner electron shell which is being filled, although it is not possible to deduce from this chemical evidence alone whether uranium is the first element in the series for which this is the case.

Professor Seaborg then advanced the hypothesis that this rare-earth-like series begins with actinium in the same sense that the "lanthanide" series begins with lanthanum. On this basis it might be termed the "actinide" series, and the first electron in this inner shell might appear in thorium. From this hypothesis, it was predicted that elements 95 and 96 should exhibit very stable three states.

Dr. Seaborg then reported that his work with R. A. James, L. O. Morgan, and A. Ghiorso in bombarding uranium 238 and plutonium 239 with very high energy (40 million electron volts) helium ions in the Berkeley cyclotron has resulted in the production of isotopes of elements 95 and 96. The chemical properties of these elements have been studied by the tracer technique.

CHICAGO SUN 11/16/42

Chicagoan Finds 2 New Elements

Discovery of two new elements, 95 and 96, "of obvious importance from the standpoint of atomic energy," was announced yesterday by Dr. Glenn T. Seaborg of the University of Chicago's Metallurgical Laboratory.

The new elements, as yet unnamed, were found by use of the cyclotron, or atom smasher, according to Seaborg, who was co-discoverer of plutonium — the base of the Nagasaki atomic bomb.

The new elements were formed as a result of the bombardment of uranium 238, an isotope (or twin) of uranium, and plutonium 239 with high energy helium ions, or alpha particles, of 40,000,000 electron volts, he said.

The work was done by Seaborg and two associates at the University of California cyclotron laboratory at Berkeley.

He made the disclosure at the 50th anniversary technical conference of the Chicago section of the American Chemical Society at Northwestern University.

New Isotope Discovered.

Seaborg revealed that he and a co-worker also had discovered neptunium 237, a new isotope of element 93, neptunium.

Aug. 18, 1942, will live in scientific history as the day that the first pure chemical compound of plutonium was produced, he said.

On that day, almost four months before physicists created the first atomic chain-reaction under the west stands of the University of Chicago's Stagg Field, scientists produced the first synthetic element and the first isolation of a weighable amount of an artificially produced isotope of any element, he said.

Cunningham, Werner Praised.

Seaborg credited the preparation of the plutonium compound, free from carrier material and all other foreign matter, to Dr. B. B. Cunningham and Dr. L. B. Werner, also of the metallurgical laboratory.

He said the case of plutonium, which has been found to exist minutely in a natural state, was the first in which a man-made element was necessary to prove its existence in nature.

Process Without Precedent.

"In the production of the atomic bomb," he said, "the problem of designing an industrial process for separating plutonium was without precedent. No one had ever seen any plutonium at the time that the plant design was under construction.

"It was necessary to test the process at concentrations correspondent to the full level of the Hanford (Wash.) plant operation, and therefore the experiments had to be conducted on the ultra-microchemical scale of operation, which employed volumes of only microliters (one millionth of a quart)."



Dr. Seaborg.

2 new elements found by U. C. atom smashers

Atom bomb research led to the discovery of two new elements, as yet unnamed but known as 95 and 96, Dr. Glenn T. Seaborg, metallurgist at the University of Chicago, announced today.

The new elements — unmixed bodies—were found as a result of smashing uranium 238, which figured in bomb research and is a close kin to U235 from which the bomb actually came. Dr. Seaborg disclosed the discovery at the 50th anniversary technical conference of the Chicago section of the American Chemical Society at Northwestern university.

There were 94 previously known elements. Associated with Dr. Seaborg in the discovery of element 95 were Ralph A. James and Leon O. Morgan. James and Albert Ghiorso were named by Dr. Seaborg as co-discoverers of element 96.

Elements may be defined in several ways. Essentially they are the fundamental chemical substances which make up all physical matter.

Dr. Seaborg told the society how atomic bomb scientists designed a plant for processing an element never seen. No one had ever seen plutonium, an element of which he was co-discoverer, when the plant for processing it was set up.

Tests of the element in amounts known as microliters—one millionth of a quart—were successfully scaled up 10 billion times in the final process.

Thirty major chemical reactions involving hundreds of operations are required before the plutonium emerges from the process at the Hanford plant, Dr. Seaborg said. The plant itself defies description, he said, "with massive structures and intricate maze of equipment, piping and remotely operated controls.

Dr. Seaborg said Plutonium, first discovered in the laboratory, has been found to exist in a natural state. Discovery of neptunium 237, a twin of element 93, neptunium, by Dr. Seaborg and a co-worker, Arthur C. Wahl, was announced.

2 New Elements Discovered

95 and 96 Born in Cyclotron Bombardment —Plutonium Found to Exist in Nature.

Chicago, Nov. 16 (A. P.).—Dr. Glenn T. Seaborg announced today the discovery of two new elements, so far unnamed and designated elements 95 and 96.

The University of California chemistry professor, now working at the University of Chicago metallurgical laboratory, made the announcement in a paper prepared for the fiftieth anniversary technical conference of the Chicago section, American Chemical Society.

Dr. Seaborg, co-discoverer of Element 94, plutonium, which was used in atomic bomb manufacture, also disclosed that plutonium, discovered in a natural state—the first instance in which a man-made element was necessary to prove its existence in nature. He also said he and a co-worker, Arthur C. Wahl, had discovered neptunium 237, a new isotope or twin of Element 93, neptunium.

Dr. Seaborg said Ralph A. James and Leon O. Morgan were associated with him in the discovery of Element 95 and he and James and Albert Ghiorso were co-discoverers of Element 96.

He said the new elements 95 and 96 were found as a result of bombardment of uranium 238, the abundant isotope of that element, and plutonium 239 with high energy ions, or alpha particles, of 40 million electron volts in Prof. Ernest Lawrence's cyclotron at Berkeley, Cal. Chemical identification studies were conducted in the metallurgical laboratory. He said identification involved the usual extensive requirement of proving that the chemical properties of the new elements were different from those of all other 94 elements.

Available amounts of elements 95 and 96 were ultra-microscopic, he said, as was the case when properties of neptunium and plutonium were first discovered, hence the "tracer" technic, made possible by the radio-active character of the elements, was used.

L.A.

Two new elements discovered

CHICAGO, Nov. 16.—(UP)—Dr. Glenn T. Seaborg, professor of chemistry at the University of California, announced today that he had discovered two new elements.

Seaborg, now working at the metallurgical laboratory of the University of Chicago, a center of atomic bomb research, announced discovery of the as yet unnamed elements at the 50th anniversary technical conference of the Chicago section of the American Chemical Society.

He was a co-discoverer of element 94, plutonium, which was used in atomic bomb manufacture.

He disclosed that plutonium, first discovered in the laboratory, has been found to exist in minute amounts in pitchblende, and that neptunium 237, a twin of neptunium 93, had been discovered.

He said the discovery of natural plutonium marked the first time a man-made element had been needed to prove its existence in nature. The new neptunium isotope, he said, has a "half-life" of 2,000,000 years.

Seaborg said the new elements, 95 and 96, were found as the result of the bombardment of uranium 238 and plutonium 239 with 40,000,000 electron volts in the University of California cyclotron.

Seaborg, assisted by M. L. Perlman, found that plutonium exists in natural state in pitchblende in the minute quantity of about one part in one hundred million million.

"This naturally-created plutonium is so small in amount that it could be identified only because of chemical properties of synthetic plutonium made in the laboratory were previously established," he said.

"The general conclusions from work on plutonium and neptunium are that these two elements are similar in chemical properties to uranium."

Seaborg said production of the atomic bomb was without precedent from every standpoint, especially because no one ever had seen any plutonium at the time the project was being planned.

DENVER POST 11/17/45

CHEMIST DISCOVERS TWO NEW ELEMENTS

Dr. Glenn T. Seaborg, Who Helped Find Atomic Bomb Material, Tentatively Designates Properties as 95 and 96.

Chicago, Nov. 17.—(A. P.)—Dr. Glenn T. Seaborg announced Friday the discovery of two new elements, so far unnamed and designated elements 95 and 96.

The University of California chemistry professor, now working at the University of Chicago metallurgical laboratory, made

the announcement in a paper prepared for the fiftieth anniversary technical conference of the Chicago section, American Chemical society.

Dr. Seaborg, codiscoverer of element 94 of plutonium, which was used in atomic bomb manufacture, also discovered that plutonium, discovered in the laboratory, has been found to exist in minute amounts in a natural state—the first instance in which a manmade element was necessary to prove its existence in nature.

He also said he and a coworker, Arthur C. Wahl, had discovered neptunium 237, a new isotope or twin of element 93, neptunium.

Dr. Seaborg said Ralph A. James and Leon O. Morgan were associated with him in discovery of element 95 and he and James and Albert Ghiorso were codiscoverers of element 96.

He said the new elements 95 and 96 were found as a result of bombardment of uranium 238, the abundant isotope of that element, and plutonium 239 with high energy ions, or alpha particles, of 40 million electron volts in Prof. Ernest Lawrence's cyclotron at Berkeley, Calif.

He said identification involved the usual extensive requirement of proving that the chemical properties of the new elements were different from those of all the other ninety-four elements.

Available amounts of elements 95 and 96 were ultra-microscopic, he said, as was the case when properties of neptunium and plutonium were first discovered, hence the "tracer" technic, made possible by the radio-active character of the elements, was used.

The General Couldn't See It 7/45

Glenn T. Seaborg, the great chemist from the University of California who has been working on the atomic bomb project at the University of Chicago, looks like the Ishpeming, Mich., farm boy he was born. At 33 he is probably the greatest chemist in the world today, yet is as matter-of-fact when talking of his tremendous discoveries as tho he were saying that water is two parts hydrogen and one part oxygen. Yesterday, in just that manner, he told of discovering the 95th and 96th elements, revealed that he had found plutonium, which he discovered in 1940, existing in a natural state, and announced that he and a co-worker had found a new isotope of neptunium much more stable than that used in making the atomic bomb. [See news section for details.]

But going back to the problem presented when he first went to work on the atomic project, designing a process for separating plutonium was, he said, without precedent from almost every standpoint. At the time that designing plants to use it was under consideration, no one had ever seen any plutonium. The chemical properties attributed to it then had been deduced solely from what might be called secondary evidence—i. e., experiments on the tracer scale. To set up the final Hanford [Wash.] plant on a basis of these experiments, he said, involved a scale-up by a factor of 10 to the 10th degree. That is, they had to design an industrial plant 10 billion times greater than the microscopic bit—half a milligram—which represented the world supply of plutonium.

The preliminary design of these plants, he said, was under way when Maj. Gen. Leslie R. Groves, who was in charge of the entire atomic bomb project, paid them a visit. When shown this microscopic bit, he remarked, with justification, "I don't see anything." *CHI. TRIB.*

2 New Elements Found by American Professor

CHICAGO — (AP) — Dr. Glenn T. Seaborg announced the discovery of two new elements, so far unnamed and designated elements 95 and 96.

Dr. Seaborg is a University of California chemistry professor now working at the University of Chicago metallurgical laboratory.

Dr. Seaborg, co-discoverer of element 94 of plutonium, which was used in atomic bomb manufacture, also disclosed that plutonium, discovered in the laboratory, has been found to exist in minute amounts in a natural state—the first instance in which a man-made element was necessary to prove its existence in nature.

HE ALSO SAID he and a co-worker, Arthur C. Wahl, had discovered neptunium 237, a new isotope or twin of element 93, neptunium.

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He said the new elements 95 and 96 were found as a result of bombardment of uranium 238, the abundant isotope of that element, and plutonium 239 with high energy ions, or alpha particles, of 40 million electron volts in Prof. Ernest Lawrence's cyclotron at Berkeley, Calif.

Only microscopic quantities of the elements are available, he said.

Two New Elements Discovered By Cyclotron Use, Seaborg Says

CHICAGO, Nov. 16 (AP)—Dr. Glenn T. Seaborg reported today the discovery of two new elements so far unnamed and designated as Elements 95 and 96.

The University of California chemistry professor, now working at the University of Chicago's metallurgical laboratory, made the statement in a paper prepared for the technical conference of the Chicago Section, American Chemical Society.

Dr. Seaborg, co-discoverer of Element 94 of plutonium, which was used in atomic-bomb manufacture, also disclosed that plutonium, discovered in the laboratory, had been found to exist in minute amounts in a natural state—the first instance in which a man-made element was necessary to prove its existence in nature.

He also said that he and a co-worker, Arthur C. Wahl, had discovered Neptunium 237, a new isotope or twin of Element 93, neptunium.

Dr. Seaborg said that Ralph A. James and Leon O. Morgan were associated with him in discovery of Element 95 and that he and Mr. James and Albert Ghiorso were co-discoverers of Element 96.

He said the new Elements 95 and 96 were found as a result of bombardment of Uranium 238 and Plutonium 239 with high energy ions, or alpha particles, of 40 million electron volts in Prof. Ernest Lawrence's cyclotron at Berkeley, Calif. Chemical identification studies were conducted in the metallurgical laboratory.

He said identification involved the usual extensive requirement of proving that the chemical properties of the new elements were different from those of all the other ninety-four elements.

Available amounts of Elements 95 and 96 were ultra-microscopic, he said, as was the case when properties of neptunium and plutonium were first discovered, hence the "tracer" technique, made possible by the radioactive character of the elements, was used.

SEES BIG PROFIT ON INVESTMENT IN ATOMIC BOMB

CHICAGO TRIBUNE 11/17/45

Scientist Tells of Radium Substitute Work

Dr. Frank H. Spedding, director of research at the government metallurgical project at Iowa State college, Ames, Ia., yesterday predicted that as the result of new techniques developed by American scientists working on the atomic bomb during the war, the United States possibly within the next 10 years may get back even more than the two billion dollars it spent bringing the bomb to completion.

Dr. Spedding, who spoke before the 50th anniversary technical conference in the Chicago section of the American Chemical society at Northwestern university in Evanston, in an interview said atomic scientists have learned how to radio-activate numerous substances as cheap substitutes for radium in the future treatment and detection of disease.

Vast New Field Opened

Radioactivated copper, he explained, can be used to chart the growth of plants whose roots will pick up the chemical from the soil. In similar manner, he said, penicillin and a host of other substances also can be activated for use as tracer elements to locate the seat of cancer and other diseases in the body. Use of such relatively cheap materials in the future, he declared, opens a vast new field to agriculture and medical science and is destined to relegate costly radium to a minor role.

As another example of the benefits which he said have come as a by-product from research on the bomb, Dr. Spedding described a method devised at Iowa for the cheap and abundant separation of elements known as rare earths. Some of these substances, used in the production of fine quality optical glass and for making high grade steels, until recently, he said, have been available only in minute quantities costing up to \$2,000 for just a pinch of the material.

The separation process, he explained, has been known for some time, but was brought to a state of perfection at Iowa State as the result of research on chemical problems having to do with nuclear studies in developing the atomic bomb.

Warns of Outlaw Action

Earlier Dr. Charles D. Coryell, a member of the University of California faculty and chief of the fission products section of the atomic bomb project at Oak Ridge, Tenn., said the world is too small to contain both human beings and the atom bomb. Unless something is done in the next three years, the speaker predicted, it may be possible for outlaw nations to build atomic bombs on a piece work basis.

He pointed out that when the first atomic bomb exploded over Hiroshima, Japan, mankind achieved a source of power 20 million times greater than that ever used heretofore.

Discovery of two new elements, as yet unnamed and designated by the numbers 95 and 96, was announced at the meeting by Dr. Glenn T. Seaborg, a chemist who played a key role in developing the atomic bomb.

The elements, he said, were found as a result of bombardment of uranium 238, the abundant isotope of that element, and plutonium 239, with high energy ions, or alpha particles, of 40 million electron volts in Prof. Ernest Lawrence's cyclotron at Berkeley, Cal.

THE SUN'S NEWS QUIZ

CHICAGO 11/19/45



1. They used to say that very few people could understand the scientific theories of the man pictured above, but everybody can understand his present position that a conference be called for international control of atomic energy. Who is he?

2. The Army has cut release points for enlisted men to what figure?

3. What discovery "of obvious importance from the standpoint of atomic energy" has been announced by Dr. Glenn T. Seaborg of the University of Chicago?

4. The horse-racing season ended for Illinois this year on Saturday. At what park was the last meeting?

5. What epoch-making airplane flight is scheduled to start today?

[Answers on Page 13.]

Sun Quiz Answers

1. Prof. Albert Einstein.
2. To 55 points.
3. Discovery of two new elements, 85 and 86 in the periodic table.
4. Sportsman's Park.
5. The first direct flight from Chicago to London.

Trail of the Atom Leads to Two New Elements

Discovery of 95 and 96, 'Spilled' Over the Radio Last Sunday, Confirmed by Chicago Scientist

The discovery of two new elements, as yet unnamed but numbered 95 and 96 in the periodic table, was announced in Chicago Friday by Dr. Glenn T. Seaborg, University of California professor of chemistry now working on atomic bomb research at the University of Chicago. Dr. Seaborg, a native of Ishpeming, Mich., disclosed the discovery in a paper which he read before the Chicago section of the American Chemical Society at Northwestern university. The discovery, of great scientific importance, follows closely the disclosure last summer that element 94, plutonium, of which he was a co-discoverer, had been added to the known elements in 1940 and used in the manufacture of atomic bombs.

Dr. Seaborg also said Friday that plutonium, first discovered in the laboratory, had been found to exist in minute amounts in a natural state—the first instance in which a manmade element was necessary to prove its existence in nature.

Twin of Element 93

He also announced the discovery, with a co-worker, Arthur C. Wahl, of neptunium 237, a new isotope or twin of element 93, neptunium. The new isotope has a half life, or period before disintegration, of 2,000,000 years, and is therefore relatively stable in comparison with the first known form, neptunium 239, which has a half life of 2.3 days.

Ralph A. James and Leon O. Morgan of the Chicago project were associated with Dr. Seaborg in the discovery of element 95; James and Albert Ghiorso in the discovery of element 96.



Dr. Seaborg

The new elements were found as a result of bombarding uranium 238, the abundant isotope of that element, and plutonium 239 with high energy helium ions, or alpha particles, of 40,000,000 electron volts in Prof. Ernest Lawrence's cyclotron at Berkeley, Calif. The chemical identification, proving that the properties of the two new elements are different from those of all the other 94 elements, was done at Chicago.

In "Rare Earth" Series

The properties not only of elements 95 and 96, but also of elements 89 to 94, which were exhaustively studied by Dr. Seaborg, indicate that the heavier elements, probably beginning with 89 and 90, actinium and thorium, are those of a "rare earthlike" series, similar in important respects to the rare earth series of elements 58 to 71 in the atomic table, he said Friday.

Dr. Seaborg revealed that he and M. L. Perlman, as far back as 1942, had been able chemically to separate neptunium and plutonium from pitchblende ore, the source of radium. However, they found that plutonium exists in a natural state in pitchblende in the minute quantity of about one part in one hundred million.

The first tests of plutonium—eventually used in the "improved" atomic bomb—were employed on amounts measured in microliters, or one-millionth of a quart, Dr. Seaborg said. The quantities were so small that Maj. Gen. Leslie R. Groves, in charge of the entire atomic bomb project, remarked as he was being shown the microscopic bit which represented the world supply of plutonium, "I don't see anything."

Grew to Huge Plant

From that has grown the government's huge Hanford plant, now producing 10,000,000,000 times as much as was available for the first experiments. Some 30 major chemical reactions, involving hundreds of operations, are required before the plutonium emerges from the process at Hanford, Dr. Seaborg said, and he described the plants themselves as "defying description, with their massive structures and their intricate maze of equipment, piping and remotely operated controls."

Because of security regulations, Dr. Seaborg was not permitted to discuss the relation of the two new elements to the atomic bomb proc-

ess beyond identifying elements 95 and 96 as being radioactive.

Apparently few people realized it, but Dr. Seaborg inadvertently disclosed the discovery of elements 95 and 96 on last Sunday's nation-wide broadcast of the "Quiz Kids" program. Army security had not authorized the release until Friday.

Dr. Seaborg, a guest on the program, was being questioned by the kids and remarked, off hand, that "when you go back to school tomorrow you can tell your teachers that there are two new elements, 95 and 96."

Dr. James Lawrie, chief chemist at the Schlitz Brewing Co., caught the significance of Dr. Seaborg's remark and mentioned it at last Monday's meeting of the Milwaukee Lions club. The Journal checked immediately with Dr. Seaborg in Chicago, who confirmed the fact, but The Journal withheld announcing the discovery at the request of Dr. Seaborg and his associates, who were anxious that the first report would be made professionally to the American Chemical society.

THE PRODUCTION OF ELEMENTS 95 AND 96

In reply to a wire requesting information in regard to the production of elements 95 and 96, the telegram given below has been received by SCIENCE:

The 60" cyclotron in the Radiation Laboratory of the University of California at Berkeley has been employed to effect the transmutation of Uranium Mass 238 and Plutonium Mass 239 into elements of atomic numbers 95 and 96, respectively.

In order to accomplish this task, the instrument was completely rebuilt by the group in the Crocker Laboratory, during the summer and fall of 1944, so that nuclear particles could be accelerated to higher energies than had been previously available.

The cyclotron was put back into operation in January 1945 and initially was capable of producing deuterons and alpha particles at measured energies of twenty and forty million electron volts, respectively.

During the next few months, Uranium 238 and Plutonium 239 were bombarded with forty million electron volt helium ions.

Element 95 was found to be produced in the Uranium targets and element 96 in the bombarded Plutonium sample.

The identity of these two elements was established by their chemical and radioactive properties.

This phase of the work was done by the Chemistry Group at the Metallurgical Laboratory at the University of Chicago.

Recently, the energy of the deuterons and alpha particles has been increased to measured values of 22 and 44 million electron volts, respectively.

GLENN T. SEABORG

METALLURGICAL LABORATORY,
UNIVERSITY OF CHICAGO,
(ON LEAVE FROM DEPT. OF CHEMISTRY,
UNIVERSITY OF CALIFORNIA AT BERKELEY)

JOSEPH G. HAMILTON, M.D.
RADIATION LABORATORY,
UNIVERSITY OF CALIFORNIA AT BERKELEY

QUIZ KIDS SCOOP WORLD ON TWO NEW ELEMENTS

CHICAGO
TRIBUNE 11/20/45
Discovery Is Disclosed

on Their Program

BY LARRY WOLTERS

That atomic discussion the Quiz Kids had recently with Dr. Glenn T. Seaborg, on leave from the University of California, to work with the University of Chicago atomic group, resulted in a noteworthy scoop: The first public announcement that two new elements had been discovered.

In response to a question on Armistice day by Richard Williams, the East Chicago quiz leader, Dr. Seaborg disclosed that two new ones—Nos. 95 and 95 had been found. They were isolated by Dr. Seaborg and associates at Bergeley, Cal.

It wasn't until last Friday that Dr. Seaborg made the formal announcement of their discovery before a meeting of the Chicago section of the American Chemical Society at Northwestern university. He told how they had been found as a result of bombarding uranium 238 andn plutonium 239 with heliumions. Dr. Seaborg was a co-discovered of plutonium.

On Sunday the Quiz Kids suggested for names for the new elements. Williams volunteered seaborgium and californium for Dr. Seaborg and his home state. Since several elements are named after the planets already, others along this line were suggested—jupiterium and martium among them.

Robert Burke, mindful of what uranium did to Nagasaki and Hiroshima, suggested internum and creatum. He also has one ready if and when No. 100 is discovered—centurium.

Houghtin Mifflin & Co. will bring out a book recounting the exploits of the Quiz Kids by Eliza Merrill Hickok, assistant program director, this season. A contract has just been signed.

Most Famous World Scientist Formerly Watts Man

Dr. Glenn T. Seaborg of Berkeley Was Jordan Hi Epehbian of '29

Professor Reid Was His Chemistry Instructor; Dr. Seaborg Prominent as Atomic Bomb Developer and Discoverer of Two New Elements of Atomic Energy

Dr. Glenn T. Seaborg one of the three men sharing the distinction of being the world's foremost scientists, was a graduate of Jordan High School, Watts in 1929. He was also that year's Epehbian. James A. Davis was principal of Jordan then and Prof. Reid was chemistry instructor.

After graduation from Jordan several of the graduates drove daily from Watts to U.C.L.A. This group included Miss Jean Shoaff, daughter of Attorney and Mrs. Peebles Shoaff, now the wife of Capt. Bernard Brownfield, M.D. who is still in Japan; James Davis, (not a relative of the school principal) later with the Los Angeles Examiner; Stanley Thompson, a nephew of Florence Donley-Rhodes of Banning, Calif. a former secretary of Watts Chamber of Commerce; James (Hymie) Merino now of Mexico City—a Mexican Government official; and Gerner Peterson, well known young man of this vicinity whose later occupation we do not know.

Glenn later received his Ph.D. degree from California University at Berkeley. He is only 32 years old.

Mrs. Maxson, Advertiser-Review Editor, in a recent "Caps And" column, told of Dr. Glen T. Seaborg's appearance on the Quiz Kids program, although his name was not mentioned at that time. He was the famous scientist whom the "Kids" questioned. It was on that program that Dr. Seaborg told of the finding of two new elements as important as Uranium and Plutonium which he referred to as simply "95" and "96". This was the first public mention of his latest discoveries. Here is the story as it appeared in the Daily News:

CHICAGO, Nov. 17.—U.P.)

Two possible new sources of atomic energy had been announced today by a University of California chemist, who said two new elements had been isolated.

The chemist, Dr. Glenn T. Seaborg, played an important part in developing the atomic bomb. He said the new elements—designated only by their numbers, 95 and 96—were of the type which was of "obvious importance from the standpoint of atomic energy."

Dr. Seaborg, addressing the Chicago section of the American Chemical society, told a nuclear chemistry symposium that the new elements were formed as result of the bombardment of a cyclotron—or atom smasher — of uranium 238, an isotope (twin) of uranium, and plutonium 239 with high energy helium ions of 40,000,000 electron volts.

The experiments were conducted in Dr. Ernest Lawrence's cyclotron at Berkeley, Calif. Associated with Dr. Seaborg in the discovery of element 95 were Leon O. Morgan and Ralph A. James. Albert Ghiorso and James were codiscoverers of element 96.

Nov. 23, 1945

THE ORIGINAL
ROMEIKE
PRESS CLIPPINGS

220 W. 19th St., NEW YORK 11, N.Y.
Tel. CHelsea 8-8860

Circ. (D 19,141)

This Clipping From

MOLINE, ILL.
DISPATCH

NOV 23 1945

**Atomic Scientist
To Speak Dec. 13
To Chemical Unit**

Dr. Glenn T. Seaborg, co-discoverer of plutonium, one of the elements in the atomic bomb, will speak December 13 at a meeting of the Iowa and the Illinois-Iowa sections of the American Chemical society at Augustana college.

One of Dr. Seaborg's assistants has been Lawrence B. Magnusson, associate chemist of the metallurgical laboratory, Chicago. Mr. Magnusson is a son of Dr. J. P. Magnusson, professor of chemistry at Augustana college.

Chemical research under direction of Dr. Seaborg in the metallurgical laboratory at the University of Chicago made possible the unprecedented Hanford Engineer works in Washington for the manufacture of plutonium.

Dr. Seaborg is a member of the Atomic Scientists of Chicago, the aims of which are the education of the public in the significance of the release of nuclear energy and the necessity of a strong international control of this energy to prevent a war which would annihilate a large portion of the population of the world.

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SCIENCE

Two New Atoms

The discovery of two new elements, combinations of electrons so rare that they have not yet been found in nature, was announced last week by Dr. Glenn T. Seaborg, professor of chemistry at the University of California, now engaged in atomic-bomb research at the University of Chicago. As yet unnamed, the new elements have been labeled only by their numbers in the atomic scale—95 and 96.

In 1940, Seaborg was also a co-discoverer of element 94, plutonium, which is used in atomic bombs. Known at first only as a synthetic element, natural plutonium, Seaborg disclosed, has since been discovered in pitchblende, the ore which yields radium, uranium, and other "rare-earthlike" elements.

Achieved by effecting a change deep in the inner orbits of the atomic electron structure, the new elements are the result of bombarding uranium isotope 238 and plutonium 239 with helium ions of 40,000,000 electron volts.

The possibility of producing these changes has been recognized for years. In 1938, in Berlin, Drs. Lise Meitner, Otto Hahn, and F. Strassmann—the first to split uranium—announced their intention to produce element 95, which they called eka-iridium. And since early 1940, other leading scientists have been conducting searches for the three new heavier elements.

But all elements heavier than uranium are supposedly unstable. Numbers 95 and 96 will certainly be of interest to atomic bombardiers.

When the Manhattan Project decided to produce plutonium in quantity for making atomic bombs, almost nothing was known about its chemical properties. It existed only in sub-microscopic quantities. By August 1942, the Metallurgical Laboratory at Chicago had isolated a weighable amount. It wasn't much. Major General Leslie R. Groves, military head of the bomb project, was shown the entire world supply. He peered hard, and remarked, "I don't see anything."

The speck which the General could not see was plenty for the chemists. Working with solutions measured in microlitres (7,000ths of a teaspoon), they accurately determined plutonium's chemical properties. Then they devised a complex process for separating it from the fiercely radioactive by-products of the uranium-plutonium pile at Hanford, Washington. The pile produced at least 100 different by-products. Most are unstable isotopes of familiar elements (the same periodic numbers but different atomic weights).

Eventually the chemists learned so much about plutonium that they decided to use their new techniques in looking for it in nature. In pitchblende, that mineral Pandora's box of exploding elements, they found unmistakable traces: one part in 100,000,000,000,000. This was the first time that the discovery of a man-made element had led to its identification in a

00021

Nos. 95 & 96

An element is a substance each of whose atoms contains the same number of electrons. Until recently, scientists thought there were 92 elements, ranging from hydrogen (with one electron circling round its nucleus) to uranium (with 92). All the

intervening numbers had been accounted for. So the chemists sat back, feeling that their long search for elements had been completed.

They sat up again with a start in 1940, when University of California scientists produced a new, "synthetic" element (neptunium) by bombarding uranium with neutrons from a cyclotron. Neptunium has 93 electrons, which meant that the list of known elements was growing at the heavy end. It grew some more that same year when Dr. Glenn T. Seaborg and co-workers synthesized plutonium, which has 94 electrons.

Last week Dr. Seaborg, speaking at Chicago, made another momentous announcement. By bombarding uranium and plutonium with high-energy helium ions, he produced two more elements: Nos. 95 and 96. He told little more about them, for like all atomic scientists, Dr. Seaborg still has G-men breathing down his neck.

TIME, NOVEMBER 26, 1945

U.C. Atom Smasher Power Is Doubled

Cyclotron Force Leads to New Elements

Power of the 60-inch cyclotron at the University of California, already the most potent in the world and the instrument in which the atomic bomb substance plutonium was discovered, was almost doubled when it was revamped in the summer and fall of 1944.

This was disclosed in an article in the magazine "Science," which today published the first scientific report on the new Elements 95 and 96, discovery of which in the Berkeley cyclotron was announced earlier this month in Chicago.

The "Science" article said that reconstruction of the cyclotron and the achievement of greater power was necessary in order to produce the new elements.

When the reconstruction was completed in Jan., 1945, the cyclotron was able to produce deuterons (heavy water "atomic bullets") of 20 million electron volts and alpha particles (helium "atomic bullets") of 40 million electron volts. Since then the power has been increased to measured energies of 22 and 44 million electron volts respectively for deuterons and alpha particles.

GREATEST FORCE

These are the highest energies to which deuterons and alpha particles have ever been accelerated.

Published pre-war statistics show that the highest energies of which the cyclotron was capable at that time were 14½ million electron volts for deuterons and 29 million electron volts for alpha particles.

Announcement of the discovery of Elements 95 and 96 was made earlier this month at Chicago by Dr. Glenn T. Seaborg, professor of chemistry at the University of California and discoverer of plutonium, on behalf of himself and Dr. Joseph G. Hamilton, assistant professor of medical physics in the

Radiation Laboratory. Drs. Seaborg and Hamilton signed today's article in "Science".

It was disclosed that Dr. Hamilton, assisted by J. R. McCharles, Thomas Putnam, and Malcolm Webb, Radiation Laboratory staff members, led the Crocker laboratory operating crew in rebuilding the cyclotron.

The "Science" article did not elaborate on the discovery of Elements 95 and 96, except to say the bombardment in the cyclotron of Uranium 238 by 40 million electron volt alpha particles resulted in its transmutation to Element 95, while Plutonium 239 was transmuted into Element 96 by the same type of bombardment.

CHEMICAL PROPERTIES

After the cyclotron bombardments the identity of the two elements was established by their chemical and radioactive properties in research by a group of chemists working with Dr. Seaborg in the Metallurgical Laboratory of the University of Chicago, where he is on leave of absence.

No names were proposed for the new elements. Plutonium and Neptunium as trans-Uranic elements were named for the two planets beyond the planet Uranus in space, Pluto and Neptune. Since there are no known planets beyond the orbit of Pluto, the same practice cannot be followed for the new elements.

Neptunium and Plutonium, Elements 93 and 94, were first produced in the Berkeley cyclotron. None of the Elements, 93, 94, 95 and 96 was known in Nature before their production in the cyclotron. Of the four, only 94, plutonium, has since been found in minute quantities in nature.

Science May Be Able to Create More Elements With Cyclotron

Making of Nos. 95 and 96 by Injection of Alpha Particles Seemed Impossible, but, This Done, Other Difficult Tasks Appear Possible

By John J. O'Neill

Two more new chemical elements, beyond plutonium of atomic bomb fame, have been created in the laboratories of the scientists, making four elements which have been created beyond those which nature provided. Each of them has atomic energy possibilities but if they do yield it they will resemble closely the uranium products in the amount of energy yielded and in the process by which they will give it up. This means two more possible atomic bomb materials.

The new elements, as yet unnamed and identified merely by their numbers, 95 and 96, are reported by Professor Glenn T. Seaborg, of the University of California, Los Angeles, and his associates, Dr. R. A. James, Dr. L. O. Morgan and Dr. A. Ghiorso, working at the metallurgical laboratory at the University of Chicago.

How Elements Were Made

The first two artificial elements were produced by shooting into the nucleus of uranium 238 an extra particle, a neutron, with an atomic weight of one. The atomic weight of the uranium was raised to 239. It was in an unstable state and nature restored equilibrium in its structure by ejecting in succession two electrons. The ejection of the first electron caused the uranium (element No. 92) to change to a new chemical element neptunium (No. 93), and the second one ejected caused neptunium to change to plutonium (No. 94). The neptunium and plutonium atoms retained the atomic weight (239).

Success with the process of injecting a simple particle into the heaviest natural element led scientists to hope that heavier particles might be injected similarly. The next heaviest particle is the heart of the heavy hydrogen, or deuterium atom, which has an atomic weight of two. The deuterium nucleus consists of a positively charged proton and a neutron having no charge united to form a single particle.

In many atom bombardment experiments in which deuterium is used as the projectile, this particle splits on striking the target atom, the unelectrified neutron getting into the nucleus of the target atom but the positively charged proton being repelled by the positively charged electrical fortifications of the target nucleus, like charges repelling each other.

Despite this situation, Professor Seaborg and his associates, Dr. E. M. McMillan, Dr. A. C. Wahl and J. W. Kennedy, using the cyclotron of Professor E. O. Lawrence, at the University of California, late in 1940, succeeded in driving the double-bodied deuterium nucleus into the nucleus of the uranium 238 atom.

An unexpected event happened. They did not increase the atomic weight of the uranium by two. Instead the uranium nucleus ejected two neutrons, which just balanced the incoming weight.

Neptunium Isotope Is Made

The incoming deuterium particle contained a positive charge and as this remained in the uranium nucleus the latter was changed to a new chemical substance with atomic number 93 which happens to be neptunium, the same substance as is produced by bombarding uranium 238 with the lighter particle, the neutron. It was a new kind of neptunium, or isotope, that was produced. It had an atomic weight of 238, whereas the one produced earlier by neutron bombardment had an atomic weight of 239.

Another set of experiments had shown that still another isotope of neptunium, one with atomic weight 237, could be made by bombarding uranium 238 with neutrons. In this instance one

neutron went in and two neutrons came out.

The next step was to use the nucleus of the helium atom, known as an alpha particle, as the bombarding projectile. The alpha particle has a weight of four, four times the weight of a neutron and double the weight of a deuteron. It consists, essentially, of two deuterons, as it contains two proton and two neutrons.

Heavy elements decay to lighter elements by emitting alpha particles so the project undertaken by Professor Seaborg and his associates was an effort to reverse the natural process of radio-activity. The heavy elements are unstable, which is the cause of their radio-activity, and gain a greater degree of stability by throwing out a succession of alpha particles. It seemed unlikely that an additional alpha particle could be forced into the uranium atom.

Despite the seeming high degree of probability that the experiment would not succeed, Professor Seaborg and his associates succeeded in injecting the additional alpha particle not only into the uranium atom but also into the artificially created plutonium atom.

Study Detects New Elements

The material subjected to bombardment in the Lawrence cyclotron was studied at the metallurgical laboratory at the University of Chicago, and here the presence was detected of the new elements, No. 95, with an atomic weight of 242, and No. 96, with an atomic weight of 243. The former would appear to have passed through a radioactive change in which an electron was emitted, for otherwise its number would be 94.

Reasoning by analogy it would seem as if the new elements 95 and 96 may be caused to produce still further new elements 97 and 98 if they can be caused to accept a neutron into their nuclei, and still other new elements if heavier particles can be injected. The injection of the heavy alpha particle into the uranium and plutonium nuclei seemed like such an impossible result before it was accomplished that the scientists are not likely to be deterred from tackling other seemingly impossible tasks.

Professor Seaborg described his finding at the recent fiftieth anniversary technical conference of the Chicago section of the American Chemical Society at Northwestern University, Evanston, Ill.

THE DAILY CALIFORNIAN

VOLUME 128 Z28

BERKELEY, CALIFORNIA, MONDAY, DECEMBER 10, 1945

NUMBER 31

Lawrence Speaks on Atom

Cyclotron To Be Completed For Peacetime Research

By Vic Bogart '48

Broad vistas of peacetime atomic research leading to new realms of science were sketched Saturday for the first time since 1941 by a top physicist when Ernest O. Lawrence, inventor of the cyclotron and a leading figure in atomic bomb production, announced details of the reconversion of

the University's nuclear research laboratories to peacetime pursuits.

Breaking the silence which has shrouded all atomic research laboratories since work began in earnest on the atomic bomb, Lawrence disclosed that the cornerstone of the future nuclear research at the University would be a gigantic 4,000-ton, 184-inch super cyclotron. The machine, diverted to war work in 1941, was never completed as a cyclotron.

The big atom smasher, which is being reconstructed and will be completed in the summer of 1946, will be immediately capable of producing deuterons (heavy hydrogen "atomic bullets") with energies of 60 million electron volts and alpha particles (helium "atomic bullets") of 120 million electric volts, Lawrence said.

These initial capacities will almost treble that of the 60-inch Berkeley cyclotron, already the most powerful in the world and the instrument which was used in the discovery of the atomic bomb substance, plutonium.

Cost of new machine is \$1,400,000 and its construction has been made possible through a grant of \$1,150,000 from the Rockefeller foundation augmented by funds from the Research corporation, the John and Mary Markle foundation and the University.

Design and construction of the super cyclotron are under the direction of William M. Brobeck, assistant director of the Radiation laboratory, and R. L. Thornton, J. E. Richardson and Kenneth McKenzie, members of the laboratory staff.

Brobeck said that the new design principles making possible the higher energies involve the use of frequency modulation. Lawrence added that this will ultimately enable the scientists to accelerate deuterons to energies of 200 million electron volts and alpha particles and protons to 400 million electric volts. These energies are within the range of cosmic rays.

Opportunities in the research for the betterment of mankind were emphasized by the professor. The enormous energies which will be achieved will make practical the heretofore impossible testing of many theories of atomic structure. The application of these energies may enable atomic physicists and chemists to do the following things:

1. The fission of many elements is probable. This is the process of splitting the atom with the resulting release of energy which is the basis of the atomic bomb.

This implies that in the future it may be possible to obtain atomic energy from other sources than uranium, the processing of which is vastly expensive.

2. New and undreamed of elements will probably be produced but their possible uses must be left for future determination. Wendell M. Latimer, dean of the college of chemistry, and Glenn T. Seaborg, one of the discoverers of plutonium, and other colleagues of Lawrence are hopeful that it may be immediately possible to produce new trans-uranic elements. Four trans-uranic elements (numbers 93, 94, 95 and 96) have been produced already by the combined proc-

ess of bombardment in the 60-inch cyclotron and chemical separation.

It will be possible also to produce many new radioactive isotopes, or "sisters," of known elements which are useful in many fields of scientific research.

3. Cosmic rays, on which many scientists presently pin their hopes of eventually understanding the nature of matter, can be produced in the laboratory for the first time with the energies of which the 4,000-ton cyclotron will be capable.

"Such fundamental research is necessary if we are to understand the forces with which we are working," Lawrence said. "While we know how to produce the atomic energy in a bomb we know very little about the elementary nuclear forces involved in the release of atomic energy."

4. New tools will be provided for research in many fields, including biology, medicine, chemistry, agriculture and others.

Science will enter a new realm of the atom with the giant atom smasher, Lawrence pointed out. "We will be breaking through a new barrier. What we find beyond should be as exciting as what we have found since the 1930's when we began breaking into the nucleus of the atom."

"That we will learn more of the elementary forces of nature is almost certain. The opportunity will exist for mankind to gain greater control of his environment through the use of this information," Lawrence stated.

When asked what practical applications of this research would be used in industry, Lawrence said that it is impossible to predict the uses to which new discoveries may be put until the nature of such discoveries can be determined.

In announcing the peacetime research program Lawrence praised United States Army authorities in granting permission for the recon-

version so soon after the termination of the war.

"Army authorities readily recognized the need for a quick return to fundamental scientific research which is the lifeblood of all technical progress," Lawrence stated.

He added that he was confident that in the days ahead most of the research will be of such a fundamental nature that it will be possible to make the results public.

Lawrence said that he would be seconded in the new research program by Donald Cooksey, associate director of the Radiation laboratory. Cooksey has been Lawrence's assistant since 1936.

Seaborg, who is still on leave of absence to the University of Chicago, will return early in 1946 to join Latimer in the direction of the chemical phases of the atomic research, such as the search for new elements.

John Lawrence, brother of the Nobel prize winner, will soon resume the direction of the biological research program with the 60-inch cyclotron in the Crocker Radiation laboratory, after four years of research in the field of aviation medicine. The 60-inch cyclotron will be devoted entirely to medical and biological research when the 184-inch machine goes into operation.

Rebuild Cyclotron at U. C.

Savants Delve Into Atom Research

A 400,000,000 electron volt cyclotron cradle for the newly-born atomic age was being reconstructed today by the University of California in Berkeley.

Diverted in 1941 to creation of atomic bomb material, the 4000-ton, 184-inch supercyclotron on Charter hill in Berkeley is being trebled in power to open broad vistas of peacetime research.

This was announced today by Dr. Ernest A. Lawrence, Nobel prize winner in 1939 and inventor of the cyclotron.

"We will be breaking through a new barrier," Dr. Lawrence said. "What we find beyond should be as exciting as what we have found since the 1930's when we began breaking into the nucleus of the atom."

LIKE HUNTING GOLD

"An intriguing program of new research will open when the new high voltage becomes available. We are impatient to learn what we shall find—it's like prospecting for gold."

Surrounded by a staff of atomic experts, Dr. Lawrence outlined expected possibilities of the new supercyclotron. These include:

1—Discovery of new elements beyond the four already found with the 60-inch Crocker radiation laboratory cyclotron.

Dr. Glenn T. Seaborg, who recently announced the discovery of elements 95 and 96, explained:

"We should find new, heavier elements which will run well over one hundred on the atomic scale. However, a final limit where the atoms become so heavy as to be unstable is in sight."

COSMIC RAYS

2—Laboratory production of cosmic rays, on which scientists presently pin hopes of eventually understanding the nature of matter.

"While we know how to produce the atomic energy in a bomb, we know very little about the elementary nuclear forces involved in the release of atomic energy," declared Dr. Lawrence.

Production of the cosmic rays, which range from 10,000,000 to 1,000,000,000 electron volts in na-

ture, will help greatly in their study.

3—Splitting of lighter atoms now becomes probable.

With the new high voltage, it may be possible to obtain atomic energy from other sources than uranium, the processing of which is vastly expensive.

4—Cracking of heretofore elementary units.

"Until now, protons and neutrons have been regarded as elementary," Dr. Lawrence said. "We now believe that it may be possible to break these units down into smaller components."

5—Providing of new tools for research in many other fields.

Already the radioactive isotopes or "sisters" of many elements have been produced in existing cyclotrons to enable scientists to obtain previously unobtainable information. Use of the supercyclotron will expand this field.

ENTER NEW REALM

With these and other possibilities, science will enter a new realm. But Dr. Lawrence and his fellow atomic pioneers declined to predict what might lie ahead.

"Each day will be like the morning the first atom bomb was tested in New Mexico," said Dr. Lawrence. "Until it worked, we didn't know what we had. These new experiments will be just as intriguing."

Diverted in 1941 to the producing of the first sizeable portions of uranium-235 pure enough for use in the atomic bomb, the huge Charter hill electromagnet was never completed as a cyclotron.

With the coming of peacetime research, it will be reconstructed as a supercyclotron by the summer of next year, Dr. Lawrence said.

Initial capacities will almost treble those of the 60-inch U. C. cyclotron, already the most powerful in the world. Immediate capacity of the \$1,500,000, 4000-ton monster will be 60,000,000 electronic volts with deuterons or heavy hydrogen "atomic bullets" and 120 million electronic volts with alpha particles or helium "atomic bullets."

New design principles including

frequency modulation will enable ultimate acceleration of deuterons to energies of 200,000,000 volts and of alpha particles and protons to 400,000,000 electron volts.

Design and construction of the super cyclotron are under direction of William M. Brobeck, assistant director of the radiation laboratory, and R. L. Thornton, J. R. Richardson and Kenneth McKenzie, staff members.

HUGE MAGNATE

Construction of the 4000-ton instrument was started in 1940. The steel in the magnet weighs 3700 tons and the copper winding 300 tons. The largest electromagnet known to exist, it is 59 feet long and some 30 feet high. The radio transmitter which provides the power has an output of 1500 kilowatts.

Dr. Lawrence said he would be seconded in the new program by Dr. Donald Cooksey, associate director of the radiation laboratory and the Nobel prize winner's assistant since 1936.

Dr. Seaborg, still on leave of absence to the University of Chicago, will return early next year to join Prof. Wendell M. Latimer, dean of the chemistry college, in chemical phases of research.

SCIENTISTS TO RETURN

Dr. John Lawrence, brother of the cyclotron inventor, will soon resume direction of biological research with the 60-inch cyclotron after four years research in aviation medicine.

Other scientists now on leave are expected to return as the 184-inch cyclotron will go on a 24-hour day and a 7-day week with various teams taking turns to further the research.

SUPER-CYCLOTRON TURNS TO PATHS OF PEACE

WIDENED ATOM RESEARCH AIDED BY NEW MACHINE



NEW CYCLOTRON.—Completion of a giant cyclotron at the University of California, to be the largest and most powerful in the world, promises to shake scientific concepts and evolve a new world that makes even advanced men of science shudder when they contemplate possibilities. Peacetime atomic research at Berkeley will be headed by Dr. Ernest O. Lawrence, topflight physicist and Nobel Prize winner; Dr. Wendell Latimer, dean of the College of Chemistry; Dr. Glenn Seaborg, one of the discoverers of the element plutonium used in the A-bomb; Dr. William Brobeck and Dr. Donald Cooksey.

Dr. Lawrence Predicts 'Wide Realm' for Science, Medicine From U. C. Work

All science is at the brink of a tremendous shakeup and the jolt that will bring it about may be touched off in the not-too-far distant future at the University of California.

The public was made very much aware of this today by Professor Ernest O. Lawrence, Nobel prize winner, inventor of the atom-smashing cyclotron and top U. S. physicist, as he outlined broad vistas of peacetime atomic investigations in connection with reconversion of the university's nuclear research laboratories.

Hopes for the scientific revolution lie in completion of a 4000-ton, 184-inch supercyclotron, to be the most powerful in the world. Portions of the machine, on which

work was initiated in 1941, were used in the production of U-235 for the atomic bombs that hastened end of the war.

The machine, to be completed next summer, may for the first time permit artificial production of cosmic rays, the obtaining of atomic energy from cheaper sources than uranium, may lead to the discovery of many new elements to aid mankind. The fight against cancer is expected to be accelerated as a direct result.

Operation of the giant atom smasher, said Dr. Lawrence, will bring science into a "new realm of the atom" and the scientific world will be "breaking through a new barrier."

New tools for the research in biology, medicine, chemistry and agriculture, Dr. Lawrence said, will be provided as a result. "Nobody knows what the ultimate results will be," he added. "Even the advanced men of science shudder when they privately speculate on possibility."

Five times more powerful than the now existing cyclotrons, the new machine will permit physicists to accelerate deuterons (heavy hydrogen nuclei) to energies of 200 million electron volts; alpha particles (helium nuclei) and protons (hydrogen nuclei) to energies of 400 million electron volts. These particles are used as "bullets" for atom blasting.

"The enormous energies which will be available will make practical the heretofore impossible testing of many theories of atomic structure," said Dr. Lawrence. This probably will lead to revision of theories and concepts. "That we will learn more of the elementary forces of nature is almost certain. The opportunity will exist for mankind to gain greater control of environment through use of this information."

The promise of artificial cosmic ray production, affording study under carefully calculated test conditions, is of significance because scientists presently believe the understanding of nature is within them, Dr. Lawrence said.

Cosmic rays are believed to result from explosions in nature that release atomic energy. Present studies have been limited.

Production of new elements and radioactive isotopes (sister elements) of known elements hold wide promises for medicine, biology and chemistry in particular. Radioactive rays have been used for some time to fight malignant growths such as cancer. New ones may be more effective in this battle.

Research connected with the A-bomb showed how to set off atomic action: how that takes place and how the energy released might be harnessed to perform economic work is still another phase of investigation to be done during peacetime.

Disclosure of the research program, said Dr. Lawrence, has Army approval although certain security regulations remain. There is to be

no information exchange with foreign scientists, for example.

The more technically minded will find new food for thought in the disclosure that the electromagnet used in the cyclotron weighs 3700 tons and is the largest known to exist. A 1500-kilowatt frequency modulation transmitter is used to shoot electron bullets. Water-filled tanks, 5 to 15 feet thick, encase the instrument to protect workers from potential radiations.

Aiding Dr. Lawrence in the new quests will be Dr. Donald Cookesey, associate director of the Radiation Laboratory. Dr. Glenn T. Seaborg, one of the discoverers of the element Plutonium used in the atom bomb, will return in 1946 to join Dean Wendell M. Latimer of the College of Chemistry, in the direction of the chemical phases of atom research. Professor Seaborg presently is on leave to the University of Chicago.

Dr. John Lawrence, brother of the Noble Prize winner, will resume direction of the biological research program, using the present 60-inch cyclotron in the university's Crocker laboratory. This machine will be devoted entirely to medical and biological research when the bigger brother goes into operation.

Invisible Parts Used In Tiny Atom Balance

Rock Island, Ill., Dec. 13 (AP)—A balance so tiny that its operating parts ranged in size from invisibility to four times the width of a human hair had to be perfected before scientists could produce plutonium, the substance in one type of atomic bomb.

Dr. Glenn T. Seaborg, codiscoverer of plutonium, told the Illinois-Iowa section of the American Chemical Society that the new field of study had been named ultramicrochemistry and that it was developed because of the extremely small quantities of the desired substances present in uranium.

Separated By Remote Control.

The balance weighed micrograms—one-millionth of a gram—with an accuracy of three-hundredths of a microgram. It was constructed of fibers of pure quartz, some of which were invisible.

Moreover, the separation of

these almost microscopic quantities had to be accomplished entirely by remote control, because of the "staggering levels" of radioactivity present, Dr. Seaborg said.

Dr. Seaborg, a University of California chemistry professor and recent discoverer of the new elements 95 and 96, as yet unnamed, said the heat generated in production of plutonium at the Hanford, Wash., plant was "the first measurable production of atomic power in a self-sustaining manner."

The heat, which comes from kinetic energy of fission fragments during the plutonium production process, has not been put to practical use, he said, because the primary purpose of the plant was to manufacture plutonium for military use.

Physicist Tells of New Possibilities

THE CHICAGO SUN, FRIDAY, DECEMBER 14, 1945



THIS IS PLUTONIUM

The cloudlike mass of material at base of test tube is plutonium, base of one of the atomic bombs. It was produced at University of Chicago.

Chemist Links New Science To Plutonium

Special to The Chicago Sun.

ROCK ISLAND, Dec. 13.—One 30,000th of an ounce of plutonium, principal component of the atomic bomb dropped on Nagasaki, was the basis for the ultramicrochemistry which resulted in the huge Hanford (Wash.) plant, Dr. Glenn T. Seaborg said tonight.

Speaking before the Illinois-Iowa section of the American Chemical Society, Seaborg, a co-discoverer of plutonium in 1940, said that the ultramicrochemistry process is to ordinary chemistry as a watch-maker's bench is to a steel works.

The minute volumes of solutions used in experimental work brought about the invention of a new type of balance in which weight is determined by the amount of twisting of a quartz fiber scale beam, Seaborg said.

Seaborg is on leave from the University of California for work in the University of Chicago's Metallurgical Laboratory. He brought 20 micrograms of pure plutonium hydroxide to the meeting for the first public inspection of the element.

Atomic Heat Held Practical

Special to THE NEW YORK TIMES. 12/14

ROCK ISLAND, Ill., Dec. 13—

The state of development of atomic energy is such that it already is a practical source of heat energy, but there are sound factors to be considered before one can decide whether it will be an important practical source of energy for any given purpose, declared Dr. Glen T. Seaborg, co-discoverer of plutonium and a leading chemist in atomic bomb research. He addressed chemists and technical men of Illinois and Iowa here tonight. His appearance was sponsored by the American Chemical Society.

Dr. Seaborg declared there were a number of special purposes for which atomic energy could and would be used. He asserted the chief limitation to the use of atomic energy was the large size of the units which, he declared, must have a sufficient amount of shielding to absorb the radiation. He went on to tell of the types of power plants where atomic energy would be useful, describing them as large stationary power plants in which the energy was removed by water or air, seagoing vessels and the propulsion of large airplanes.

"These considerations," declared Dr. Seaborg, "lead to the conclusion that atomic energy best can be used where a high concentration of energy is needed and, at least in the beginning, atomic energy use will not result in an economic saving compared to other sources of energy, such as coal and gasoline."

ATOMIC BOMB PUZZLE SHIFTS TO RED CAPITAL

Byrnes to Try for a New Global Solution

BY ROY GIBBONS

World interest in debate over the atomic bomb shifted yesterday to Moscow, where the subject of international control over the weapon is scheduled for discussion in the coming week by State Secretary Byrnes at a conference of foreign ministers representing the United States, Great Britain, and Russia.

The parley, initiated by Byrnes, will try to obtain the cooperation of Russia in measures looking to creation of an authority over the bomb by the new allied nations organization.

Byrnes, according to Washington, D. C. news dispatches, brought about the meeting to get international negotiations out of the doldrums in which they have been becalmed by failure last September of the London conference of foreign secretaries.

Atom Bar Rolls Reds

Since that time, observers report, the Russians have withdrawn more and more into an isolationist shell, evidencing pique over exclusion from sharing the atomic secret. Nursing their grievance over the atomic controversy, the soviets have refused to cooperate in any of the proposals advocated by the American and British governments, commentators say.

A commission to control the bomb under allied nations organization auspices, it has been pointed out, can be set up only with the cooperation of the Russians, who so far have given no indications of enthusiasm over the proposition.

Diplomatic relations, because of the bomb, are reported to have worsened considerably since Foreign Commissar Molotov in his Red anniversary speech announced to the world that the soviets 'will have the atomic bomb and many other things.'

Russia Wants Secret Now

The Russians, it is said, want the secret of the bomb given to them at once, and not indirectly by participation at some future time under conditions that might be prescribed by an allied nations agreement administered thru a power pact.

Byrnes himself does not know the secret of the bomb, but before leaving by plane for the conference he said he would take with him Dr. James E. Conant, president of Harvard university and one of the scientists who helped solve the atom secret. Conant has expressed belief that it will take the Russians at least a decade or more to solve the mystery and make the bomb on their own resources.

Scientists Would Stop Production

Elsewhere, during the week—developments in the field of the atomic bomb were highlighted by a resolution sent to President Truman by the science division of the independent citizens' committee of the Arts, Sciences, and Professions, Inc., calling on America to declare its willingness to discontinue manufacture of the bomb.

The committee, headed by Dr. Thorin Hogness, atomic bomb project chemist at the University of Chicago, also recommended at its meeting in Chicago that this country agree at the Moscow conference to destroy its present atomic bomb stockpile as soon as an international agreement is reached for control of the weapon.

Atom Held Up by Army

Before a senate committee considering means of controlling all forms of atomic energy, Dr. Leo Szilard, University of Chicago physicist, indicated that, had it not been for what he termed "unnecessary" security precautions imposed by the army, the atomic bomb could have been available at the time of the Normandy invasion, which started June 6.

Other significant news included official confirmation in a joint statement by the army and navy that the atomic bomb will be used in a test of might against modern naval vessels, and disclosure by Dr. Glenn T. Seaborg University of Chicago atomic chemist, that it costs around 2 million dollars to build one atomic bomb.

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Invisible Parts Key To Building Of Atomic Bomb

ROCK ISLAND, Ill., Dec. 24. (AP)—A balance so tiny that its operating parts ranged in size from invisibility to four times the width of a human hair had to be perfected before natural scientists could produce plutonium, the material in one type of atomic bomb.

Dr. Glenn T. Seaborg, co-discoverer of plutonium, told the ~~Illinois-Iowa~~ section of the American Chemical Society that the new field of study had been named ultramicrochemistry and that it was developed because of the extremely small quantities of the desired substances present in uranium.

The balance weighed micro-

grams—one millionth of a gram—with an accuracy of three-hundredths of a microgram. It was constructed of fibers of pure quartz, some of which were invisible.

Moreover, the separation of these almost microscopic quantities had to be accomplished entirely by remote control, because of the "staggering levels" of radioactivity present, Dr. Seaborg said in his prepared address.

The success of the experiments, he said, enabled construction of the huge plant at Hanford, Wash., which produced plutonium on a large scale for military use.

Dr. Seaborg, a University of California chemistry professor and recent discoverer of the new elements 95 and 96, as yet unnamed, said the heat generated in production of plutonium at the Hanford plant was "the first measurable production of atomic power in a self-sustaining manner."

CHEMISTRY

Naming New Elements Is Problem to Discoverer

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► NAMING the two newest and heaviest chemical elements, numbers 95 and 96, is proving quite a problem to their discoverer, Dr. Glenn T. Seaborg, of the University of California and the University of Chicago.

One difficulty is that the astronomers have not discovered any planets of the solar system beyond Pluto and therefore the newest transuranium elements cannot be named by following the system used in naming number 93, neptunium, named after planet Neptune, and number 94, plutonium, named after planet Pluto. Plutonium is one of the elements that can be used in making atomic bombs.

One possibility might be to rely on some property of the new elements in

naming them, Dr. Seaborg said, speaking as guest of Watson Davis, director of Science Service, on the "Adventures in Science" radio program over the nationwide network of the Columbia Broadcasting System. Dr. Seaborg indi-

cated that he might shortly name element 95, at least.

He has already received many suggestions for naming the new chemical babies.

Science News Letter, December 29, 1945



DR. GLENN T. SEABORG

His Work On A-Bomb Made Ishpeming Native Famous

DEC. '45.

ISHPEMING—When the nation's press announced that Dr. Glenn T. Seaborg, brilliant 32-year-old University of California scientist, was co-discoverer of plutonium used in the manufacture of the atomic bomb and two new elements so far unnamed, Theodore Seaborg, a former Ishpeming resident now living in California, and Henry Seaborg, instructor in the manual arts department of Ishpeming high school, felt justifiable pride.

Dr. Seaborg, atom bomb scientist, was born in Ishpeming, the son of Theodore Seaborg, former Cleveland Cliffs Iron company machinist, and moved west with his family when still a child. Henry Seaborg is his uncle.

In a paper prepared for the 50th anniversary conference of the Chicago section, American Chemical society, Dr. Seaborg announced the discovery of the two new elements so far unnamed and designated elements 95 and 96 in the expanding periodic table.

Laboratory Discovery

His announcement followed on disclosure this summer that element 94, plutonium, of which he was co-discoverer, had been added to the known elements in 1940 and used in atomic bomb manufacture.

In his paper, the California scientist revealed that plutonium was a laboratory discovery and has been found to exist in minute amounts in a natural state. It is the first instance, he said, in which a man-made element was necessary to prove its existence in nature.

He also said he and a co-worker, Arthur C. Wahl, had discovered neptunium 237, a new isotope of neptunium, which is considerably more stable than the first known form, neptunium 239.

The new and unnamed elements, he said, were found as a result of bombardment of uranium 238, the abundant isotope of that element, and plutonium 239, with high energy ions, or alpha particles, of 40,000,000 electron volts in Professor Ernest Lawrence's cyclotron at Berkeley, Calif.

Chemical identification studies of the new elements were conducted



DR. GLENN T. SEABORG

in the metallurgical laboratory of the University of Chicago, where Dr. Seaborg, who is professor of chemistry at the University of California, is now working.

Dr. Seaborg received his bachelor of arts degree in chemistry at the University of California at Los Angeles in 1934, and a doctor of philosophy degree in chemistry at the University of California at Berkeley in 1937.

First a research associate, working with Professor Gilbert N. Lewis in the college of chemistry at that university, he was successively advanced from instructor to assistant professor and professor.

Has Published 40 Papers

Nuclear chemistry and nuclear physics have been his main fields of investigation, and his work since his co-discovery of plutonium in 1940 has been largely in connection with the application of that element to atomic energy. It was while on leave from California at the Chicago metallurgical laboratory during the last three and a half years that he performed the major work in development of chemical separation procedures which were used in

connection with the manufacture of plutonium at Clinton, Tenn., and Hanford, Wash., where the giant government atomic bomb plants are located.

Since 1936 he has published about 40 papers on the general subject of nuclear physics, artificial radioactivity and the applications of artificial radioactivity to chemistry, including comprehensive reviews and compilations in *Reviews of Modern Physics* and *Chemical Reviews*.

The young Californian is a member of the American Chemical society, the American Association for the Advancement of Science, Sigma Xi, and a fellow of the American Physical society.

NEW HEAVIES

IDENTIFICATION of two new man-made elements has been announced. These two new elements, as yet known only by their atomic numbers, 95 and 96, make a total of four synthetic elements, the others being neptunium and plutonium, which are vital links in the series of reactions which was first completed in the atomic bomb. This report by Dr. Glenn T. Seaborg, made in a talk to the Chicago Section of the American Chemical Society, is the first professional paper on current nuclear research; and it indicates that the mysterious Manhattan District is sponsoring research not related to immediate war needs.

No one has reported, however, whether these new elements should rank in importance with their predecessors, neptunium and plutonium. They were produced by bombardment of uranium and plutonium in a cyclotron and although only sub-microscopic quantities are as yet available, these are adequate for an investigation of chemical properties. Apparently the new elements are radioactive, but whether they disintegrate with release of energy, as does plutonium, was not reported.

This advance is another step in a series which began with Becquerel's discovery of radioactivity in 1896 and later included such apparently unpromising and even unrelated contributions as Einstein's theorizations and the many discoveries on the principles of atomic structure which, during the 1930's, received short paragraphs in news journals and practically no comment in industrial journals. Even Mme. Curie's father, when congratulating her on the discovery of radium, said, "What a pity it is that this work has only theoretical interest, as it seems."

Although the economic potentialities of nuclear energy are not as clear as the immediate political and military implications, they seem close to realization. Dr. Arthur Compton, head of the National Academy of Science's Committee on Use of Uranium in War, believes it not unlikely that within ten years power companies will consider use of atomic power for purely economic reasons. To provide the necessary shielding from harmful radioactivity, atomic power units may have to weigh at least 50 tons, precluding their use in automobiles and aircraft, but still leaving many opportunities for development. The announcement that an important portion of a new \$8,000,000 General Electric Company laboratory will be

devoted to nuclear research emphasizes today's earnest consideration of these opportunities.

Realization of these opportunities will require continually greater knowledge of the materials and relationships involved. The discovery of elements 95 and 96 contributes to this knowledge by adding two more to the group of six "heavy elements" on which the nuclear scientists are focusing attention. Availability of these new elements will permit research leading to further knowledge of how this heavy group fits into the orderly and meaningful "periodic classification" of the elements which has enabled chemists greatly to extend their understanding of other groups of elements.



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THIS CLIPPING FROM
ELECTRONICS
NEW YORK, N. Y.

C JAN - 1946

Two New Elements Discovered

DISCOVERY OF TWO new elements, 95 and 96 in the periodic table, was announced by Dr. Glenn T. Seaborg of the University of California at a recent American Chemical Society symposium. ~~Dr. Seaborg~~, co-discoverer of plutonium, element 94, which was used in the atomic bomb dropped on Nagasaki, said the new elements belong to the heavy type and are of importance from the standpoint of atomic energy.

The new elements were discovered as the result of bombardment of uranium 238, an isotope or twin of uranium, and plutonium 239, an isotope of plutonium, with helium ions of 40,000,000 electron volts in the cyclotron at the University of California.

A new hypothesis regarding the relationship of these heavy elements was advanced, suggesting that elements from actinium (number 89) through the newly discovered elements 95 and 96 form a series corresponding to the only previously known series of elements which also have similar properties, the Rare Earths, elements 58 to 71.

CHICAGO HERALD-
AMERICAN
JAN. 15, 1946

Juniors to Honor U. of C. Expert

His work at the University of Chicago in the production of the atomic bomb earned for Dr. Glenn T. Seaborg, 33, today the designation of "Chicago's outstanding young man of 1945."

Selection was made by the Chicago Junior Association of Commerce, which will honor him tomorrow night at the Morrison Hotel.

Dr. Seaborg is on leave to the U. of C.'s metallurgical laboratory from the University of California.

He is co-discoverer of plutonium, one of the bases of the atomic bomb, and of elements 95 and 96. These two new elements were found as a result of bombardment of uranium 238, the twin of that element, and plutonium 239.

HONOR FOR HENRY FORD II.
Dr. Seaborg is co-discoverer of neptunium 237, a new twin of element 93, neptunium.

At the banquet, the U. S. Junior Chamber of Commerce will award jeweled honor keys to the nation's 10 "outstanding young men," all under 36 years of age.

They include Henry Ford II, president of the Ford Motor Company; Robert S. Ingersoll, Chicago works manager of the Ingersoll steel division of the Borg-Warner Corporation, and Charles Luckman, former Chicagoan and Lever Brothers executive.



Dr. Glenn T. Seaborg.

Atom Expert Chicago's Man of 1945

The "outstanding young man of Chicago for 1945" is Dr. Glenn T. Seaborg, 33, of the University of Chicago, the Chicago Junior Association of Commerce announced today.

Dr. Seaborg, whose research at the university helped lead to the development of the atomic bomb, will receive the association's award at its annual dinner tomorrow evening in the Morrison Hotel.

The national award will be presented to Henry Ford II.

DR. SEABORG is the co-discoverer of plutonium and of Elements 95 and 96. On leave from the University of California for the last four years, he has directed research at the University of Chicago for separating plutonium in the amounts and purity needed for the atomic bomb.

He also is the co-discoverer of neptunium 237, and is the author of more than 40 technical papers.

J. Howard McGrath, U.S. solicitor general and former three-term governor of Rhode Island, will be the principal speaker at tomorrow's dinner.

Glenn Seaborg 'man of the year'

Dr. Glenn T. Seaborg, University of Chicago scientist who helped develop the atomic bomb, today was named Chicago's outstanding young man for 1945. The award is made annually by the Chicago Junior Assn. of Commerce.



Dr. Seaborg, co-discoverer of plutonium, will be given the award tomorrow at a dinner in the Morrison hotel at 7 PM. Ralph Rohweder, president of the association, will make the presentation.

The award is designated for Chicago men under 36. Dr. Seaborg is 33. He has been "on loan" for four years from the University of California.

CHICAGO DAILY NEWS 1/15/46

U. of C. Atomic Scientist Named City's No. 1 Man

Dr. Glenn T. Seaborg, 33, co-discoverer of plutonium, base element of the atom bomb, and of the elusive elements 95 and 96, will receive the award of "Outstanding Young Man of Chicago" from Chicago Junior Association of Commerce tonight at a banquet at the Morrison Hotel.

Henry Ford II, 28-year-old automobile industrialist, will receive the jeweled honor keys symbolizing the national award, voted him Sunday by the U.S. Junior Chamber of Commerce.



Dr. Glenn Seaborg.

The dinner will celebrate the 25th anniversary of the founding of the U.S. Junior Chamber.

Dr. Seaborg was selected as the most distinguished Chicagoan under 36 for his work at the University of Chicago, where he has been "on loan" from the University of California for four years in the production of the atomic bomb.

He was primarily responsible for the separation procedures used in the manufacture of plutonium at Clinton, Tenn., and Hanford, Wash.

Eight of the 10 chosen as the

nation's outstanding young men will be in Chicago tonight for the celebration banquet. They are:

Dr. Van R. Potter, University of Wisconsin cancer researcher; Robert S. Ingersoll, workers manager of the Ingersoll Steel Division of the Borg-Warner Corp., Chicago; Col. Frank McCarthy, former assistant secretary of state; James Linen, publisher of Time magazine; Charles Luckman, vice-president of Lever Bros., soap manufacturers; George C. Dade, president of Dade Bros., war shipping experts, and Gene Root, chief of the aerodynamics section of the Douglas Aircraft Co.

Two recipients, J. Wes Gallagher, director of the Associated Press in continental Europe, and Abe Fortas, undersecretary of the interior and adviser to the U.S. United Nations Organization delegation, will be unable to be present.

Kup's column



THE Chicago Junior Assn. of Commerce's selection of Dr. Glenn T. Seaborg, the U. of C. atomic scientist, as "Chicago's outstanding young man of 1945" was an example of perfect timing. Dr. Seaborg, who is here on loan from the University of California, will be a Chicagoan only a few more months. By then he'll have completed his stay of four years here and return to California. . . . Dr. Seaborg has been working exclusively on nuclear energy for the past six years and at no time did he ever doubt the success of the earth-shaking experiment he helped conduct. . . . The scientist, who will devote his career to nuclear energy, believes atomic power will be harnessed in five or 10 years to drive huge planes and ships, but not smaller objects like the automobile.

* * *

RECIPIENT
Distinguished Service Award
OF
CHICAGO



GLENN T. SEABORG
University of Chicago

Glenn Seaborg was born on April 19, 1912, in Ishpeming, Michigan. He was awarded his Ph.D. in Chemistry at the University of California, Berkeley, in 1937. Upon graduation he joined the staff of the university as a research associate and instructor, where he was soon advanced to the position of assistant professor and then professor.

In 1942, he was given a leave of absence to the Metallurgical Laboratory of the University of Chicago, where he was primarily responsible for the development of the chemical separation procedures which were used in connection with the manufacture of plutonium at Clinton, Tennessee, and Hanford, Washington. He was the co-discoverer of plutonium at the University of California in 1940. Investigations since then have largely been in connection with the application of plutonium to atomic energy. Also, he is the co-discoverer, recently, of elements 95 and 96 at the Metallurgical Laboratory.

An author of some forty papers on the general subject of nuclear physics, artificial radio activity, and their applications to chemistry and a member of many outstanding technical societies, he is recognized as a foremost authority on atomic research.

Achievement

WEDNESDAY, JANUARY 16, 1946
DISTINGUISHED SERVICE AWARD BANQUET
MORRISON HOTEL - TERRACE CASINO

Mr. Spengeman: As Chairman of the local distinguished service award committee, it is very gratifying to see our work culminated in this wonderful banquet at which we are about to honor the man chosen to receive the 1945 award.

From a field of very capable candidates from Chicago, I believe that the Board of Judges has exercised excellent judgement in their choice of Doctor Glenn T. Seaborg as this year's recipient of the Chicago award.

Doctor Seaborg came to Chicago in April of 1942 as a chemistry professor on leave from the University of California at Berkely. He came with a few other men who were to be his associates at the University of Chicago to start work on the chemistry of Plutonium. And from that small group, the section expanded to one hundred scientists under his supervision. This group was responsible for the development of a process that later was used in the manufacture of atomic bombs.

Many of his accomplishments in this capacity at the University of Chicago were outside the narrow scope of the work to which he was delegated, and Doctor Seaborg and his associates are credited with having discovered two new elements and having contributed tremendously to the knowledge of nuclear chemistry. Many other accomplishments in this capacity at the University of Chicago were outside the narrow scope of the work to which he was delegated, and Doctor Seaborg and his associates are credited with having discovered two new elements and having contributed tremendously to the knowledge of nuclear chemistry. Many other accomplishments in

U. S. JUNIOR CHAMBER OF COMMERCE BANQUET
TERRACE CASINO, MORRISON HOTEL, CHICAGO

AMERICAN BROADCASTING COMPANY, JAN. 16, 1946

9:00-9:15 pm Central Standard Time

ANNOUNCER: MR. HARRY WISMER, Sport Director,
American Broadcasting Company

---0---

(OPENING)

WISMER: Ladies and gentlemen this is Harry Wismer speaking to you from the stage of the Terrace Casino of Chicago's Morrison Hotel. Here the Chicago Junior Association of Commerce is playing host to the United States Junior Chamber of Commerce at the annual distinguished service awards banquet. There is upwards of a thousand people here tonight including many outstanding business and industrial leaders from all over the country.

It is at this banquet every year that the Junior Chamber of Commerce honors the ten most outstanding young men of the year in the United States.

This year, the U. S. Chamber of Commerce has selected as the nation's number one -- "outstanding young man of the year" Henry Ford the second -- 28 -- year old president of the Ford Motor Company. And tonight, Mr. Ford will be awarded that title and a diamond distinguished service award key. But first, here is Mr. Alfred Spengeman, Chairman of the Chicago Distinguished Service awards committee, who will make a special presentation to Dr. Glenn T. Seaborg of the University of Chicago. Doctor Seaborg has been selected the most outstanding young man of 1945 in the Chicago area. Mr. Spengeman

DR. SEABORG: (con't)

Page Three

Mr. Spengeman (con't)

this field may be directly traceable to his efforts, but because of national security reasons, cannot be cited here.

Doctor Seaborg was one of the earliest of the Chicago group to realize the grave social and economic implications of the development of atomic energy. He was one of the members of the Executive Committee of the Atomic Scientists selected at the time that group was organized and he is now a member of the Advisory Committee of Atomic Scientists.

It gives me great pleasure to present to Doctor Seaborg, the local distinguished service award for the year, 1945.

DR. SEABORG: Thank you Mr. Spengeman.

MR. SPENGEAN: And now, Doctor Seaborg, Mr. Edward J. Kelly, the mayor of the city of Chicago, would like to say something to you.

MR. KELLY: Doctor Seaborg, as mayor of the city of Chicago, I want to congratulate you upon receiving this outstanding award. On behalf of the people of Chicago, I want to pay tribute to you and your accomplishments. We are proud to have men like you. It has indeed been a pleasure to witness this presentation tonight.

DR. SEABORG: Thank you Mayor Kelly.

I also want to thank the Chicago Junior Association of Commerce for conferring this honor on me. The fundamental investigations on nuclear energy for which this citation is made are, of course, not the work of one individual but rather a group of men.

Although time does not permit the mentioning of many names, I will mention the early work of Arthur C. Wahl, Joseph W. Kennedy, Edwin M. McMillan and Emilio Segre on plutonium, of Burriss B. Cunningham and Louis B. Werner in its first isolation, of Stanley G. Thompson in conceiving the chemical extraction processes which were used in its large-scale manufacture and of Isadore Perlman, who contributed to many phases of the work.

We feel grateful that the Chicago Junior Association of Commerce has signalled out science in this special mention.

The special attention given now to nuclear energy comes about largely as a result of the attendant, far-reaching social and political problems which should be the concern of all people.

I want to thank you again for myself and the many others whom I have not time to mention tonight.

Man-of-the-Year Honor to Ford

Production can provide steady jobs at high wages for increasing numbers and can make America a land of industrial opportunity, Henry Ford II, president of the giant Ford Motor Company, believes.

Speaking at a dinner given by the Chicago Junior Association in the Morrison Hotel last evening, the 28-year-old industrialist accepted the United States Junior Chamber of Commerce award as the nation's outstanding young man of the year. Nine other similar awards were made.

Dr. Glenn T. Seaborg, University of Chicago nuclear scientist who played a major role in developing the atomic bomb, was presented the service award of Chicago at the dinner. Of the atomic bomb, he said:

"We are not sharing the atomic bomb with Russia. The bomb is of international concern and should be shared in that manner."

Recipients of the USJCC citations, in addition to Ford, were Frank McCarthy, assistant secretary of state; James Lenin, publisher of "Time" magazine; Charles Luckman of Chicago, executive vice president, Lever Brothers Company; J. Wes Gallagher and Abe Portas (in absentia); Dr. Van R. Potter, biochemist; George C. Dade, president of Dade Brothers; Gene Root, Douglas Aircraft Company, and Robert S. Ingersoll, Borg-Warner Corporation.

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CLIPPING FROM

NEW YORK WORLD-TELEGRAM
Circ. D. 373,879 S. 269,339

JAN 18 1946

Atomic Heat Production Bared

By the Associated Press.

DETROIT, Jan. 18.—Atomic heat already is being produced on a large scale, although no effort yet has been made to put it to practical use, according to Dr. Glenn T. Seaborg, co-discoverer of plutonium.

Dr. Seaborg, a University of California chemistry professor who has been working on the atomic bomb project, told a joint meeting of the Detroit section of the American Chemical Society and the Metropolitan Detroit Science Club last night that disposal of the heat has created a problem for the government plutonium plants.

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LANCASTER, PA., INTELL. JOURNAL

Circ. D. 24,193

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Plutonium Co-Discoverer Says Atomic Heat Being Produced On Large Scale

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Dr. Seaborg, a University of California chemistry professor who has been working on the atomic bomb project, told a joint meeting of the Detroit section of the American Chemical Society and the Metropolitan Detroit Science Club Thursday night that disposal of the heat has created a problem for the government plutonium plants.

The heat involved, he said, comes from the kinetic energy of fission fragments resulting from the separation of plutonium from uranium.

Describing some of the problems involved in preliminary research work on the atomic bomb, Dr. Seaborg said special instruments had to be developed to deal with ma-

terial in microgram amounts, a microgram being one millionth of a gram. It developed a new field of study, he said, that had been named "ultramicrochemistry." An ultramicro-balance was designed, Dr. Seaborg said, that could weigh amounts as small as a microgram with an accuracy of three hundredths of a microgram.

For purposes of comparison, he said, a ten cent piece weighs about 2,500,000 micrograms.

"The beam and other operating parts of this balance," he continued, "are constructed of fibers of pure quartz ranging in diameter from about four times that of a human hair down to fibers which are invisible to the unaided eye."

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Cir. (D 395,201) (Sat. 294,296)

This Clipping From

NEW YORK, N. Y.
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This Clipping From

NEW YORK, N. Y.
HERALD TRIBUNE

Scientist Says Atom Heat Is Being Made, Not Used

Causes Problem in Government Plutonium Plants

DETROIT, Jan. 17 (AP).—Atomic heat already is being produced on a large scale, although no effort yet has been made to put it to practical use, according to Dr. Glenn T. Seaborg, co-discoverer of plutonium.

Dr. Seaborg, a University of California chemistry professor, who has been working on the atomic-bomb project, told a joint meeting of the Detroit section of the American Chemical Society and the Metropolitan Detroit Science Club tonight that disposal of the heat had created a problem for the government plutonium plants.

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00047

The Chicago Maroon

54 YEARS OF SERVICE AND LEADERSHIP

THE UNIVERSITY OF CHICAGO, FRIDAY, JANUARY 25, 1945

Prize Winner . . .



DR. GLENN T. SEABORG

Atom-bomb scientist at the University who was named the outstanding young man of Chicago for 1945 last week by the Chicago Junior Association of Commerce.

OAKLAND TRIBUNE

U.C. Scientist Wins

Honor in Chicago 1/24/46

BERKELEY, Jan. 29.—Dr. Glenn T. Seaborg, University of California professor of chemistry and co-discoverer of plutonium, has been named 1945's outstanding young man of Chicago by that city's Junior Association of Commerce.

The 33-year-old professor was commended for his work as director of research at the University of Chicago's project for the separation of plutonium and for his responsibility in supervising its manufacture at Clinton, Tenn., and Hanford, Wash.

On leave from the university, for the strategic wartime assignment, Dr. Seaborg is expected to return to his position on the Berkeley campus next month.

Famous Scientist Would Like To Visit Jordan Hi This Summer

He Stated Saturday in Interview; School Which Dr. Seaborg, Atomic Authority, Attended Has Warm Place in His Heart; Now at Chicago University; Is Returning to Berkeley U.C.

On Saturday, January 27, in an interview with Dr. Glen Seaborg of Chicago University, this noted scientist stated to Mrs. Maxson of the Advertiser-Review, that there is no doubt atomic energy will be used for commercial purposes. How soon, he said, depends upon "how much is put into it" by this government. If, he said, the government puts as much money and as much scientific effort and research to work as it did during wartime, we could be using this wonder-energy in perhaps two or three years. If we do not put forth a full effort, it is likely ten or perhaps fifteen years may pass before there is much commercial use of it. The obtaining of the necessary materials is a potent factor.

Dr. Seaborg and his friend and associate Dr. Stanley Thompson, another of the noted scientists whose work in connection with the development of atomic energy has been so outstanding, were visiting relatives in South Gate, enroute from Chicago to Berkeley, Calif. where both will be located after about three months. Dr. Seaborg will head the Dept. of Chemistry at California State University at Berkeley and Dr. Thompson will continue to work side by side with him as has been the case the last three years in the Chicago University.

Something of peculiar interest to this community is the fact that these two young men were, a few years ago, in attendance at Jordan High School, from which both graduated and then attended U.C. L.A. while driving back and forth each day to that college from 9903 Holmes avenue, which was the home of Stanley Thompson's grandmother, Mrs. Sims, lovingly known to almost everyone here as "Grandma Sims". Glen's parents, Mr. and Mrs. Theodore Seaborg resided in South Gate at that time, as they do now, but these two boys being almost inseparable, both spent a great deal of their time in Watts at the Holmes Avenue address.

Lauds Professors at Jordan

Dr. Seaborg, in reply to a question from Mrs. Maxson as to Jordan High school and his teachers there, said that he especially remembered Prof. Logan Reed and Prof. Hicks. Both were his instructors and to them he felt he owed a great deal of whatever success has come since leaving their classes. Asked if he would like to visit Jordan, on one of his frequent trips out here, he said he certainly would and may be able to do so. He will be in Chicago for three months yet, but after that at Berkeley, and able to get down here oftener. Mrs. Maxson suggested that he might like to be here for the graduation exercises of the Summer class and this seemed to find him agreeable if it turns out that he can be free at that time. Dr. Seaborg has the pleasing, modest personality almost invariably associated with true genius—and greatness.

In addition to his associate, Dr. Stanley Thompson, Dr. Seaborg said that another Los Angeles man had attained great prominence in the atomic energy field. His name is Isadore Perlman. He, too, will be at Berkeley.

Both Dr. Seaborg and Dr. Thompson are married. Mr. and Mrs. Thompson have one child, a

daughter, and (whisper) the Seaborg's—as Walter Winchell may soon be telling you—expect the stork's visit in the summer. Their first.

Dr. Seaborg's parents have resided at 9237 San Antonio, South Gate for the past 22 years. Dr. Thompson's mother, Mrs. C. P. Fay, and his grandmother, Mrs. Sims, live in South Gate also, since moving away from Watts a few year ago. Another person who took great interest in the career of these two boys during their years at Jordan and UCLA—and now, too, of course, is Florence Donley-Rhodes—an aunt of Stanley Thompson and a former secretary of Watts Chamber of Commerce, present secretary at Banning, Calif.

A few weeks ago the names of the leading scientists of the United States—and of course that, now means the world—were compiled and the list read over the air on one of the major programs. There were fifteen names read. Dr. Seaborg's was one of the first three. In a later radio address, Dr. Seaborg credited his friend and associate, Dr. Stanley Thompson with having made certain discoveries of paramount importance to all science. Dr. Seaborg has been in great demand as a speaker and has been interviewed on many of the most important radio broadcasts. His name is famous everywhere.

Both these scientists are quite young men—33 years of age. Dr. Seaborg was born April 19, 1912 and Dr. Thompson on March 9, 1912. So the same "stars of destiny" have hovered over both. The years to come will probably be alive with mention of their names and fame.

The



Jaycee



Chicagoan

VOLUME 9

JANUARY, 1946

NUMBER 1

Presenting . . .
Chicago JAC Recipient

DISTINGUISHED SERVICE AWARD



GLENN T. SEABORG
University of Chicago

The Distinguished Service Award to the outstanding young man in the Chicago area was presented to Dr. Glenn T. Seaborg, a young scientist at the University of Chicago. The award was made at the annual D.S.A. banquet of the Junior Association of Commerce. In addition to Chicago's own award winner, the winner of the United States Junior Chamber of Commerce award, Henry Ford II, was also present at the dinner. Chicago Jaycees were hosts to the USJCC at the affair, which was also held to celebrate the 25th anniversary of the national organization.

United States Solicitor General J. Howard McGrath, three-term Governor of Rhode Island, was the principal speaker. Radio announcer Norman Ross did the honors as toastmaster. Selection of Chicago's own D.S.A. winner was made by a committee headed by Al Spengeman, and his committee consisted of the following men: Harry Sugar, Russel Pierce, Bob Jafek and Ray Walker.

Dr. Seaborg came to Chicago in April, 1942, with a few other men who were to be his associates at the University of Chicago, to start work on the chemistry of plutonium. From that small group the section expanded to one hundred scientists under the supervision of Dr. Seaborg. This group was responsible for the study of the chemistry of plutonium and the development of a process for separating plutonium from uranium. This process was eventually used at the Hanford Engineering Works. As late as 1942 it was estimated by some very responsible scientists that it would not be possible to learn enough about the chemistry of plutonium to design a process in less than five years, but the process was designed and actually put into operation to such an extent that it was possible to produce atomic bombs from plutonium in a little over three years from the time Seaborg first came to Chicago.

The success of the work was due to Dr. Seaborg's ability as a scientist, coupled

with his very unique ability as a designer and as a director of work. He was outstanding among his colleagues as a man who was able to direct efforts toward the important goal and avoid any waste of the limited manpower on side issues. As a director he showed a great deal of imagination and daring in embarking on a program of ultramicrochemical research, working with quantities of a thousandfold smaller than those which had been considered standard microchemical quantities before. It was only by using these novel and unusual techniques that it was possible to make some of the essential chemical tests on plutonium at a time when only microgram quantities were available.

Seaborg was one of the co-discoverers of plutonium, both the first isotope to be discovered, Pu-238 and the isotope Pu-239 which was used in atomic bombs. He was also one of the men who determined that plutonium isotope was in fact fissionable with slow neutrons, the property which makes it all-important as an atomic explosive.

Prior to the war, Dr. Seaborg had established a reputation as one of the leading workers in the field of radiochemistry and in the investigation of new radioactive isotopes. Dr. Seaborg was one of the earliest ones of the Chicago group to appreciate fully the grave social and political implications of the developments of atomic energy, particularly the atomic bomb, and to realize that to a large extent the responsibility for pointing out to the world the tremendous possibilities of this development rested primarily on the scientists who participated in the work. He was one of the members of the Executive Committee of the Atomic Scientists elected at the time of the organization of that group in the fall of 1945. He is now a member of the advisory committee of the atomic scientists.

00051

Detroit paper Jan. 1946

Operation Of Industrial Plants With Plutonium Possible, Discoverer Says

Finder Of Atom Bomb Element Visits Local Plant

Possibility of operating industrial plants with energy from plutonium was disclosed by Dr. Glen T. Seaborg, co-discoverer of the element plutonium of atomic bomb fame when he toured the north and south plants of Wyandotte Chemicals corporation.

The 32-year-old scientist amazed local production executives when he told them that "sufficient energy is available in plutonium to operate the entire plant for a 24-hour period with a little more than a half pound of this new element."

For the past three and one-half years, Dr. Seaborg has been on leave of absence from the University of California to the Metallurgical laboratory of the University of Chicago. Here he was primarily responsible for the development of the chemical separation procedures which were used in connection with the manufacture of plutonium at the atomic bomb plants in Tennessee and Washington.

While in Chicago he was also co-discoverer of two new chemical elements known as 95 and 96.

Dr. Seaborg was the guest of Dr. Roy E. Heath, manager of industrial sales of the Ford division of Wyandotte Chemicals, on his recent tour. In the last years of the war, Dr. Heath was loaned by W.W.C. to join Dr. Seaborg's staff working on the atomic bomb in Chicago.

While in Detroit, Dr. Seaborg addressed the local branch of the American Chemical society.

Plutonium Discoverer On Tour



Dr. Glen T. Seaborg, co-discoverer of the element plutonium which made the atomic bomb possible tours local plants of the Wyandotte Chemicals corporation. Here Dr. Seaborg (center) is shown in Chlorine Plant No. 2 with Dr. Gerald Pumplin, superintendent (right) and Milton F. Dickman, production staff (left).

N. Y. WORLD TELEGRAM 2/7/46
'Creating' a New Element
Lighter Than Hydrogen Possibility

By DAVID DIETZ,

Scripps-Howard Science Editor.

Creation of a chemical element lighter than hydrogen, a possible scientific wonder suggested by Dr. Arthur E. Ruark of the U. S. Naval Research Laboratory, is just the opposite of what was accomplished in the making of the atomic bomb.

During that venture, Dr. Glenn T. Seaborg and his associates created new chemical elements, both heavier than uranium, the previously known heaviest element. They were neptunium and plutonium.

There are 92 chemical elements, beginning with hydrogen and ending with uranium. Consequently neptunium is No. 93, plutonium No. 94, and the two new, as yet unnamed, elements Nos. 95 and 96.

It will be more difficult to find a number for the new lightweight element suggested by Dr. Ruark. However, he has a name for it, to-wit, "positronium."

Ordinary hydrogen, the lightest known chemical element, is also the simplest in structure. It has the nucleus of one proton while one electron revolves around it. The weight of this atom is almost entirely in the nucleus since the proton is 1840 times as heavy as the electron.

Positronium, as its name suggests, would have a nucleus consisting of a positron while one electron revolved around it. Since the positron has the same weight as the electron this would mean an atom about 800 times lighter than hydrogen.

But the positron is a very elusive particle. It appears in certain atom-smashing experiments and then disappears when it collides with an electron. The average life of a positron is about one ten-billionth of a second.

Dr. Ruark, however, thinks that

positronium could be called into existence with the aid of the betatron, the new atom-smashing machine that parallels the cyclotron. The cyclotron provides beams of positive particles, while the betatron supplies beams of electrons.

However, with the aid of the betatron there is a roundabout way to get strong beams of positrons also. This would be done by creating a beam of electrons which in its turn would strike a target releasing a powerful beam of radiation or gamma rays.

If these rays have high enough energies, they will on striking a second target be converted into positrons and electrons. This is the conversion of energy into matter and just the opposite of what goes on in the atomic bomb where matter is converted into energy.

Each photon or "bullet" of energy is turned into a positron and an electron. Physicists have named this "pair production."

The trick, then, would be to use magnetic and electric fields to separate the positrons from the electrons. The beam of positrons would then be shot into a gas of low atomic number, preferably helium.

Dr. Ruark thinks that in enough cases an electron would be attracted into an orbit around a positron to create atoms of "positronium". If so, this could be detected with the aid of a spectroscope.



Chicago Section

AMERICAN CHEMICAL SOCIETY

February Meeting

Furniture Club of America
666 North Lake Shore Drive
Friday, February 15, 1946

Dinner 6:15 P.M., \$2.00—Meeting 7:45 P.M.



Some Chemical Aspects of the Plutonium Project

GLENN T. SEABORG

Metallurgical Laboratory, University of Chicago and University of California (Berkeley).

Professor Seaborg was born in Michigan (1912) and received his training in chemistry at the University of California at Los Angeles (B.A., 1934) and at the University of California at Berkeley (Ph.D., 1937). Following his formal training, he served for two years (1937-39) as research associate with Professor Gilbert N. Lewis and was then appointed as an instructor in the College of Chemistry of the University of California at Berkeley. In 1941, he was promoted to the rank of assistant professor; and, in 1945, in recognition of his outstanding work, was raised to a full professorship. His main field of research has been nuclear chemistry and nuclear physics. In 1940, he was codiscoverer of the element Plutonium at the University of California. Since that time, his studies have been largely in connection with the application of plutonium to atomic energy. Since 1942, he has been on leave of absence from his University for work at the Metallurgical Laboratory of the University of Chicago. Here, he was primarily responsible for the development of the chemical separation procedures which were used in the manufacture of plutonium at Clinton, Tennessee, and Hanford, Washington. Recently, he was codiscoverer of elements 95 and 96 at the Metallurgical Laboratory. Since 1936, Dr. Seaborg has published about forty papers on the general subject of nuclear physics, artificial radioactivity, and the applications of artificial radioactivity to chemistry, including comprehensive reviews and compilations in *Reviews of Modern Physics* and *Chemical Reviews*. He is a member of the American Chemical Society, AAAS, Sigma Xi, and a Fellow of the American Physical Society.



G. T. Seaborg

To secure dinner, your reservation card should be mailed not later than Tuesday of meeting week; reservations by phone may be made up to 10 A.M. Thursday—Phone Wabash 5083. Cancellations by phone will be accepted up to noon of meeting day. Difficulties in our Caterer's food orders necessitate an early knowledge of the number of dinners to be served. Your cooperation will be appreciated.

N.Y. WORLD TELEGRAM 2/16/46.

Group to Survey Atomic Power Use

A broad survey of nucleonics, the new field of scientific endeavor dealing with the release of energy from the nucleus of the atom will feature the 109th annual national meeting of the American Chemical Society at Atlantic City April 8 to 12, it was announced today.

The meeting, first to be held by the society since 1944, is expected to draw some ten thousand chemists, chemical engineers and industrialists, according to Col. Bradley Dewey, society president.

The survey will be under the chairmanship of Dr. Glenn T. Seaborg, co-discoverer of plutonium, one of the atom bomb's bases, and also of elements 95 and 96. Dr. Seaborg, a University of California chemistry professor, is in charge of plutonium research for the Manhattan project at the University of Chicago Metallurgical Laboratory.

Nuclear power's far-reaching implications for mankind will be emphasized by an exhibit, the first of its kind ever staged, on the harnessing of this new form of energy, its use in the atomic bomb and its potential service in science and industry, it was said.

Peacetime applications of many other wartime advances also will be discussed.



Dr. Glenn T. Seaborg.

N.Y. JOURNAL AMERICAN

Atomic Energy Seen In Star Medical Role

CHICAGO, Feb. 16 (AP).—

Use of atomic energy in the conquest of disease and to further other fields of science may overshadow its use as a source of power.

Dr. Glenn T. Seaborg, co-discoverer of plutonium, said radioactive isotopes, or variant forms of elements, produced during the development of atomic power can be employed to "tag" atoms in the human body for tracer experiments in medicine.

THE ORIGINAL **ROMEIKE** PRESS CLIPPINGS

220 W. 19th St., NEW YORK 11, N.Y.
Tel. CHelsea 3-8860

Cir. (D 46,417)

This Clipping From
WILMINGTON, DEL.
JOURNAL EVERY EVENING

FEB 16 1946

Chemists to Dramatize Atom at Convention

NEW YORK, Feb. 16 (AP).—The American Chemical Society said today sessions dramatizing the impact of atomic power upon civilization would feature its 109th national meeting April 8 to 12 at Atlantic City, N. J.

The first meeting of the society to be held since 1944 will be attended by 10,000 chemists, chemical engineers and industrialists, the announcement said.

An exhibit on the harnessing of nuclear power, its use in the atomic bomb and its potential service in science and industry will be held.

Dr. Glenn T. Seaborg, University of California chemistry professor, and co-discoverer of plutonium, one of the atomic bomb's bases, will be chairman of a broad survey of nucleonics.

JOURNAL OF COMMERCE AND COMMERCIAL N. Y.

Wide Survey of Atomic Power To Feature A.C.S. Spring Meet

2/19/46.

The impact of atomic power upon the world will feature the 109th national meeting of the American Chemical Society.

The meeting will be held in Atlantic City, N. J., April 8 to 12, Col. Bradley Dewey, president, announced over the week-end. Ten thousand chemists, chemical engineers and industrialists will participate in the largest meeting in the history of American chemistry.

Seaborg Heads Program

The program will include a broad survey of nucleonics, the new field of scientific endeavor dealing with the release of energy from the nucleus of the atom, under the chairmanship of Dr. Glenn T. Seaborg, co-discoverer of plutonium, one of the atomic bomb's bases, and also of elements 95 and 96. Dr. Seaborg, a University of California chemistry professor, is in charge of plutonium research for the Manhattan Project at the University of Chicago Metallurgical Laboratory.

Nuclear power's far-reaching implications for mankind will be emphasized by an exhibit, the first of its kind ever staged, on the harnessing of this new form of energy, its use in the atomic bomb and its potential service in science and industry.

Peacetime applications of many other wartime advances will be discussed. Developments in plastics, petroleum, rubber, food, gas and fuel, medicinal chemistry, education and other fields will be reported in the several hundred papers to be presented at sessions of seventeen of the society's professional divisions. More than 100 local sections of the society will be represented.

The nucleonics discussions will be sponsored by the division of physical and inorganic chemistry. Other sessions of this division will con-

sider low-temperature research, the relations of other properties of molecules to their structures and interactions in protein solutions.

An innovation at the Atlantic City meeting will be a joint forum of six divisions on the subject of polymers—the multiple molecular structures making up rubbers, fibers and plastics. The forum will be sponsored by the paint, varnish and plastics division, headed by Dr. Adolph C. Elm of the New Jersey Zinc Co., Palmerton, N. J., with the cellulose, colloid, organic, physical and inorganic, and rubber divisions participating.

Dr. R. H. Ball of the Celanese Corporation of America will preside at the forum sessions except the first, on April 9, when Dr. Paul J. Flory of the Goodyear Tire & Rubber Co. will conduct a special discussion of "Physical Chemistry of Copolymers and Copolymerization."

Wartime progress toward the conquest of malaria will be reported in papers on "Antimalarial Agents" to be read before the division of medicinal chemistry. Proteins, amino acids and vitamins will be considered in the division of agricultural and food chemistry.

A round-table discussion of "Fuel in Wartime Europe" will be held by the division of gas and fuel chemistry. "Electrical Insulating Materials" will be the subject of meetings of the division of industrial and engineering chemistry. "The Professional and Economic Status of Chemists" will be taken up by the division of chemical education, with Dr. A. L. Elder of the Corn Products Refining Co., Argo, Ill., as chairman.

Also convening will be the divisions of analytical and micro chemistry, sugar chemistry, petroleum chemistry, water, sewage and sanitation chemistry, biological chemistry and history of chemistry.

Declares Atomic Energy Produced On Large Scale

PEORIA JOURNAL-TRANSCRIPT
2/22/46

Members of Peoria section, American Chemical society, students, and guests who attended the dinner meeting of the society last night in the YWCA heard Dr. Glenn T. Seaborg of the Metallurgical laboratory of the University of Chicago and a co-discoverer of the element plutonium give a highly technical discussion of atomic energy and the principles of atomic explosion.

Dr. Seaborg, who was primarily responsible for the development of the chemical separation procedures used in the manufacture of plutonium at Clinto, Tenn., and Hanford, Wash., said that atomic energy on a large scale is now being developed in Tennessee.

Slides were used to illustrate points in his talk.

Dr. Cecil D. Langford, of the Northern Regional Research laboratory, introduced the speaker, and the business meeting which preceded was presided over by G. R. Barnett.

Nison N. Hellman, physicist chemist at the laboratory, formerly worked with Dr. Seaborg on the atomic bomb project at the University of Chicago.

PEORIA JOURNAL-TRANSCRIPT 2/22/46



CHEMISTS HEAR TALK ON ATOM—Dr. Glenn T. Seaborg (right), of the University of Chicago metallurgical laboratory, spoke on atomic energy at a meeting of the Peoria section, American Chemical society, last night at the YWCA. Shown with him are (left to right) Dr. Cecil T. Langford, who introduced the speaker; Nison N. Hellman, physical chemist at the northern regional research laboratory, who worked with Dr. Seaborg on atomic research, and Dr. E. C. Lathrop, head of the agricultural residues division at the research laboratory. (Journal-Transcript Photo.)

ATOMIC WAR ^{PEORIA} DANGER CITED ^{STAR} _{7/22/46}

World Control Need, Chemists Told

Within 10 years there will be stockpiles of atomic bombs in the hands of many nations—and they will eventually lead to an atomic war—unless there is international control, Dr. Glenn T. Seaborg, co-discoverer of plutonium, a base of the atomic bomb, told the Peoria section of the American Chemical society at the YWCA Thursday evening.

"There is no secret," he declared. "All the fundamentals were in the literature even before the war. The biggest secret we had was that the bomb would work, and now that's out."

Each nation can develop its own "know how," he said.

Operation of an international inspection system, he said, could make prevention of atomic bomb manufacture "feasible." Also, he added, understandings relative to use of atomic energy must be fitted into future international agreements.

Industry Distribution

Reminding that there is "no way of making an atomic bomb not go off," he said that "more important than the number of bombs we have is the distribution of our population and industries."

Atomic energy's aid in the conquest of disease and in other fields of science may surpass its service as a source of power, he said, pointing out that radioactive isotopes, or variant forms of elements, which are produced during the development of atomic power can be employed to "tag" atoms in the human body for tracer experiments in medicine, and for similar purposes in chemistry, physics and industrial research. These substances also "will probably have great therapeutic value in medical applications," he added.

Nuclear power may be of great importance in operation of large stationary power plants, and perhaps even in ships and large submarines (which would then have long cruising ranges), Dr. Seaborg said, but there is no likelihood that atomic energy based upon the fission principle will ever be a practi-

cal source of power for ordinary automobiles, or that a convenient pocket-size source of energy could be provided by a gram of uranium or plutonium, even though that amount of fissionable material potentially contains a sufficient amount of energy to be useful.

To use atomic energy for operation of large stationary plants, he said, there must be adequate space for the many feet of steel and concrete needed to shield personnel from the radiation involved.

Comparison of Energy

Since atomic energy can best be used where a high concentration of energy is needed, he said, at the beginning at least it will not result in economic saving compared to other sources of energy such as coal and gasoline.

Speaking from a censored manuscript for security reasons ("In view of the spy scare going over the country at this time I think I had better be very careful"), Dr. Seaborg gave in what he called a "gross over-simplification" a still very complicated (for a non-chemist reporter) explanation of the system of manufacturing plutonium, which he helped discover in 1940.

Named after the planet Pluto (because it is the next one beyond Uranus, after which Uranium is named) and given the atomic symbol Pu, the plutonium composed the first artificially produced isotopes to be seen. The process for separating it from uranium was without precedent from every standpoint, and its chemical properties had been deducted solely from secondary evidence.

Minute Scale

He illustrated parts of his talks with slides. One diagrammed a scale used in ultra-micro-chemistry which has a weighing accuracy of within one three-hundredth of a microgram. (A U. S. dime weighs 2500,000 micrograms.)

G. R. Barnett was chairman of the meeting, and Dr. C. T. Langford, chief of the engineering and development division at the Northern Regional Research laboratory, introduced the speaker.



Lawrence (left) and his boys—Latimer, Seaborg, Brobeck, and Cooksey

FEBRUARY 25, 1946 NEWSWEEK

SCIENCE

Young Men of the Atom

Big names spangled the galaxy of physicists, chemists, and engineers who helped to launch the atomic bomb. As the great laboratories went back to a peacetime basis for pure research, this concentration of top-flight scientists was broken up and scattered through the more important institutions.

Two Nobel prize-winning physicists, Prof. Harold C. Urey and Prof. Enrico Fermi, went to the University of Chicago. Last week, Dr. Ernest O. Lawrence, one of the key men in the atomic-bomb project, announced the crack personnel obtained for the University of California Radiation Laboratory at Berkeley. Lawrence, now 44, boasts some big names, too. But the man who at 38 won the Nobel Prize for inventing the cyclotron recognizes the value of youthful daring and curiosity as well. With his able associate director, Donald Cooksey, 53, Lawrence will have under him some of the most brilliant young men in the field. These include:

☛ *Glenn T. Seaborg, 33:* A tall, loose-jointed, good-natured chemistry professor, Seaborg discovered plutonium and the elements 95 and 96, which are still unnamed. On wartime leave from the University of California to the University of Chicago, the young chemist directed the plutonium separation work there. Seaborg is returning to Berkeley to work with Wendell M. Latimer, 52, dean of the College of Chemistry, and one of the chief organizers of chemical research on bombs.

Embryo Scientists Talk Abstrusely as Any Hepcat

"Heterogeneous showers of sub-atomic particles coming from extra-terrestrial regions," a phrase tossed off lightly by young David Cudabeck, 17, of Napa, Calif., may mean nothing to the layman until it is translated as "cosmic rays." To David, who experiments with rays, it's as easy as spelling c-a-t.

David is one of the 40 young scientists who are here to compete for \$11,000 in scholarships in the Science Research Talent Institute, holding its meetings today at the Statler. This is the fifth in a series of annual conferences sponsored by Westinghouse and Scripps-Howard for the purpose of encouraging youngsters who are preparing for scientific research.

HEAR LECTURES

Today, the young scientists will listen to addresses from such eminent scientists as Dr. Ferrin Long, director of the department of preventive medicine, Johns Hopkins University; Dr. Glenn T. Seaborg, atomic energy research scientist at the University of Chicago Metallurgical Laboratory, and Dr. Selman A. Waksman, microbiologist.

Sight-seeing is not nearly so important to these teen-agers as the lectures they hear. One highlight of the conference will be an address Monday on "The Structure of Matter," by Dr. Lise Meitner, visiting professor of physics at Catholic University, famous for her research that unlocked the door to atomic energy.

Between tightly scheduled sessions, the youthful scientists talk with each other in terms requiring more than a superficial knowledge of the new discoveries that have widened the scientific horizon during the past years. But, despite all the polysyllabic chatter, these youngsters make clear their earnest conviction to go further and probe more deeply into areas of research that still have left puzzles for the human mind to solve.

STILL BOBBY SOXERS

Very few of the youngsters wear spectacles and some of them wear bobby-sox. In casual sport clothes, they would not be spotted as academicians, but once they speak, they do so with authority in their varied fields of endeavor.

Sixteen-year-old Douglas Baird, Whitesboro, N. Y., has already invented an instrument that can be inserted in a regular telephone to aid the hard of hearing. Douglas is the second member of his family to win a Science Research Talent scholarship, for two years ago his sister, Joan, was one of the winners. She is now a second-year pre-medic.



Marilyn Rohrer, 17, one of the finalists in the science talent search, examines her collection of 33 brain specimens. Marilyn, of Elizabethtown, Penn., wants to study brain surgery; gave up a trip to Europe with an all-girl orchestra, with which she plays, to continue her studies.

Of the 40 young scientists, 11 are girls. Bobby-soxer Elizabeth Laufer, 17, Philadelphia, Pa., said that while her studies to date have been on trees and insects, she has another scientific objective.

"My greatest interest is in diseases of the human body, particularly cancer or infantile paralysis. I'm going to be a research worker in those fields of medicine," she said.

To these future nuclear physicists, research chemists, surgeons, biologists, engineers, astronomers and metallurgists, the search for knowledge is more exciting than a dope sheet to a gambler. Today they listen to famous scientists speak. In the world tomorrow they will be the scientists.

Glenn T.
**Dr. Glenn Seaborg to Address Range
Engineers**

Dr. Glenn T. Seaborg, noted scientist and co-discoverer of plutonium, will address a meeting of the Marquette Range Engineers' club in the Mather Inn on Monday night, April 1. Dr. Seaborg, of the faculty of the University of California and until recently on leave at the University of Chicago, was born in Ishpeming. This month he will give addresses before gatherings of scientists in New York City and in Washington, D. C.

Club To Hear
Daily Mining Journal.
**Atom Bomb
Scientists**

ISHPEMING, Mar. 8 — One of the best programs the Marquette Range Engineers club has ever offered has been arranged for its meeting Monday evening, April 1, when two scientists who have been associated in developments of the atomic bomb will discuss, as far as they are permitted, some of the interesting problems of that project.

They are Dr. Glen Seaborg, native of Ishpeming, highly accredited in the engineering research field and acclaimed one of America's promising scientists and Mrs. R. C. Mahon, the former Dr. Eleanor Conway, who did anatomical research in the development of the Manhattan project.

Dr. Conway gained her Ph. D. in anatomy and was previously professor of anatomy at the University of Chicago, teaching histology and neurology. She also did research work in lymphatic tissue and blood-forming tissue. She will also discuss some of the efforts of the UNO Atomic Control Commission. Her brother, the Rev. Mr. Conway, has been liaison officer between the atomic authorities and members of Congress and she has been kept informed of developments.

Dr. Glenn Seaborg has been nationally commended for his work and has accepted a research assignment at the University of California, following his great contribution to the development of the atomic bomb.

The Range club emphasizes that members are welcome to invite guests. There will be a Dutch lunch.

WOMEN'S AND MEN'S

MATHEMATICS CLUBS

of

CHICAGO

and

METROPOLITAN AREA

ANNUAL JOINT DINNER MEETING

Friday Evening, March Fifteenth

6:30 P. M.

Central Y.M.C.A.

19 S. LaSalle Street

Plutonium Discoverer Tells Of Arduous Climb to Fame

By JOHN BELOW

After being third - degreed for fifteen minutes, I was finally admitted to the inner recesses of the New Chemistry Building, the shrine of the atomic scientists of the University. It is, in case the reader doesn't know, that long, low, jerry-built structure between 56th and 57th on Ingleside ave. I was escorted by a pretty young lady into the office of Dr. Glenn T. Seaborg, the famous atomic scientist.

He told me that he was born April 19, 1912, in the small town of Ishpeming, Mich. Near the end of high school days, Dr. Seaborg decided that he would go into the physical sciences. He received his A.B. degree in chemistry from the University of California at Los Angeles, and, in 1937, received his Ph.D. from the University of California at Berkeley. His thesis had the erudite title of "Inelastic Scattering of Fast Neutrons." All through college he supported himself by working as a laboratory assistant and examination marker at the wage of 50 cents per hour.

For the next two years he was a research associate at the U. of California at Berkeley. From '39



GLENN T. SEABORG

to '41 he was an instructor of chemistry, and in '41 he became an assistant professor of chemistry. On April 19, 1942 (his birthday, incidentally), he came to the Metallurgical Laboratory at the U. of C. to work on the atom bomb. Discoverer of Plutonium

His fame has come about large-

ly as a result of his discovery of and work with, plutonium, element number 94, of great help in the atomic work, on which he started to work late in 1940. His co-workers were A. C. Wahl, E. M. McMillan, and J. W. Kennedy. Dr. Seaborg recently discovered elements number 95 and 96. They haven't been named as yet, because the last few elements (uranium, neptunium, plutonium) have been named for the outer planets, and there are no known planets beyond Pluto.

The Distinguished Service award of the Chicago Junior Association of Commerce was presented to Dr. Seaborg, January 16 for his scientific accomplishments.

Urged to Write Books

While I was in his office, Dr. Seaborg received a telephone call from a publisher who wanted him to write a book. He stated that he had received five offers to write books but that he couldn't accept any of them now because of the pressure of his work.

In June, 1942, he married Helen Griggs, the former secretary of Professor Lawrence, inventor of the cyclotron of the University of California.

Atomic Bomb Expert To Address Chemists

Dr. Glenn T. Seaborg, atomic bomb expert, will discuss future scientific possibilities at a meeting



of the Physical Division of the Pittsburgh Section, American Chemical Society, on Tuesday at 8:30 p. m. in the Mellon Institute.

Dr. Seaborg, who developed the chemical separation procedure used in the atomic bomb

project, also is co-discoverer of plutonium and elements 95 and 96.

His topic will be "Future Possibilities with Radioactive Tracers."

* * *

Free Musicale Offered

A free musical program will be presented at 8:30 p. m. Sunday in the Arts and Craft Center, Shady and Fifth Aves.

Sponsored by the Musicians Club of Pittsburgh, the program will be given by Sara Marie Gugala, violinist; Ida Bonato, pianist; John Thomas, flautist; and Florence Henderson, pianist.

DETROIT FREE PRESS

A-Scientist's ^{7/22/48}

Talk Changed

Dr. Glenn T. Seaborg, an atomic scientist, will speak on "A Record of Chemical Progress" at 4 p.m.



Monday in Room 211 of Wayne University's Main Building, Warren and Cass.

The lecture previously was scheduled for 7 p. m. Monday. Dr. Seaborg was the codiscoverer of plutonium, man-made source of atomic energy.

Seaborg

He is a member of the nine-man general advisory committee appointed by President Truman to assist the Atomic Energy Commission.

THE ORIGINAL
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Tel. - CHelsea 8-8860

Cir: (D 75,280)

This Clipping From
BIRMINGHAM, ALA.
POST

MAR 2-6 1946

ELEMENTS GAP CAN BE CLOSED

Scientists Suggests That
Four Rare Chemicals
Be Manufactured

By Science Service

PITTSBURGH, March 26.—The production of artificial means of four chemical elements, numbers 43, 61, 85 and 87, now known to be extremely rare or non-existent in nature, was made known by Dr. Glenn T. Seaborg, professor of chemistry at the University of California and co-discoverer of the elements plutonium 95 and 96 during atomic bomb research, in an address to the physical chemistry section of the Pittsburgh section of the American Chemical Society here last night.

With the manufacture and investigation of the properties of these four elements, all the gaps in the table of chemical elements have been closed. Although all four of these elements have been reported discovered in earlier years by various experimenters, the researches reported by Dr. Seaborg call in question these earlier reports based on less positive methods of analysis.

Experiments by Drs. C. Perrier and Emilio Serge showed that the chemical properties of 43 resembled those of its heavier homolog, rhenium, to a greater extent than they resembled those of manganese, the lighter element most resembling it.

Radioactive forms of element 61 were formed in experiments by both Drs. J. D. Kurbatov and Marion L. Pool and Drs. C. S. Wu and Emilio Segre. This element is a rare earth with a behavior that is to be expected from a rare earth.

Radioactive element 85, whose isotope has an atomic weight of 211, was made by bombarding bismuth with 32 million electron-volt alpha particles. Its general behavior is that of a metal, with little resemblance to the other halogens, of which iodine is typical. Drs. Dale R. Corson, K. R. Mackenzie and Emilio Segre investigated its properties.

A radioactive form of element 87, given the name Ack, has been discovered resulting from the decay of actinium. This isotope discovered by Dr. M. Perey has a mass of 223 and lives but a short time. As was expected, it behaves like a heavy alkali metal.

Dr. Glenn T. Seaborg Tells Chemists How Atom 'Tracers' Aid Medical Research

By Science Service

PITTSBURGH, March 27.—Artificial production of four chemical elements, numbers 43, 61, 85 and 87, which are extremely rare or non-existent in nature, was told by Dr. Glenn T. Seaborg, professor of chemistry at the University of California, in an address to the American Chemical Society here last night.

With the manufacture, and investigation of the properties of these four elements, all gaps in the table of chemical elements have been closed. Although all four have been reported discovered in earlier years, Dr. Seaborg questioned these earlier reports based on less positive methods of analysis.

Actually the experiments with these elements have been performed with unseeable and unweighable amounts by means of the "tracer" technique developed in atomic research. The course of the elements in reactions is followed by their radioactivity instead of by chemical means.

Unlimited possibilities for the application of radioactive tracers to scientific problems and to the treatment of disease were foreseen by Dr. Seaborg.

'MOST USEFUL TOOL'

"Many biologists believe that artificial radioactivity has given biology and medicine what is probably the most useful tool for research since the discovery of the microscope," said Dr. Seaborg, "because almost all the elements and compounds in biological systems can be tagged and their course through living systems studied."

The chain reacting pile used in the production of plutonium for the manufacture of atomic bombs produces large amounts of neutrons of high intensity and as a result it is possible to produce in large quantity isotopes that are used as "tags" or "tracers."

One of the most useful of the isotopes thus made is radioactive carbon 14, which has a half-life of thousands of years. Since carbon is



DR. GLENN H. SEABORG
Atom research aids science.

so important in the living world, being able to tell where a carbon atom travels and what it does by spying upon it with an apparatus that spots its explosive decaying will give scientists new information on what happens during living and chemical changes.

CANCER POSSIBILITIES

Radiophosphorus, radiosulfur and radiiodine are among the other radioactive isotopes that, according to Dr. Seaborg, will offer opportunities for important research.

One exciting finding is that radiophosphorus accumulates in

leukemic tissues, thus opening the possibility that it can be used in the treatment of this cancer-like disease of the blood cells. The radiophosphorus would bombard the diseased tissues with beta rays destroying them as X-rays do.

The study of cancer is another possible use of tracers. As in the case of leukemia, Dr. Seaborg explained, "there is the possibility of accumulating the radioactive ma-

terial in the cancerous tissue."

"It has occurred to many investigators," he reported, "that it should be possible in the future to synthesize some compound containing a radioactive substance, this compound having the property of being selectively absorbed by the cancerous tissue so that the radioactive rays can act directly at this spot without giving harmful effects on the body's healthy tissues."

T. B. EXPERIMENT

Tagging of bacteria with radioactive carbon 14 is a possibility, Dr. Seaborg declared. A beginning has been made in tagging the tuberculosis bacillus with radioactive phosphorus but the experiments have not yet been completed.

Radioactive iodine has been used in the treatment of patients suffering from high blood pressure by Drs. J. G. Hamilton and M. H. Soley, while Dr. J. H. Lawrence has been successful in the application of radioactive phosphorus to the temporary control of the blood disease, polycythemia vera.

Industry will also benefit from radioactive materials resulting from the atomic bomb researches and the manufacture of plutonium, Dr. Seaborg predicted. Radioactive indicators will be used to follow the course of products and impurities in large industrial processes.

Radioactive tracers may also help solve fundamental problems in genetics, such as the connection between the genes in the chromosomes that cause brown eyes and the actual deposition of the pigment in the cells of the iris.

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SAN FRANCISCO, CAL., NEWS
Circ. D. 137,519

MAR 27 1946

THE ORIGINAL
ROMEIKE
PRESS CLIPPINGS

220 W. 19th St., NEW YORK 11, N.Y.
Tel. CHelsea 3-8860

Circ. (D 32,724)

This Clipping From
EVANSVILLE, IND.
PRESS

MAR 27 1946

All Possible Chemical Elements Now Produced, Scientists Announce

By Science Service

PITTSBURGH, March 27.—The production of four chemical elements by artificial means has been revealed by Dr. Glenn T. Seaborg, professor of chemistry at University of California.

These elements are either extremely rare or non-existent in nature. Dr. Seaborg was co-discoverer of the elements plutonium 95 and 96 during the atomic bomb experiments. He revealed the production of the elements in an address here last night before the American Chemical Society.

With the manufacture of these elements, numbers 43, 61, 85 and 87, all the gaps in the table of chemical elements have been closed. Thus, all the basic substances of which all matter is composed have now been produced.

Radioactive isotopes of element 43 were produced by the bombardment of molybdenum with deuterons, the nuclei of heavy hydrogen atoms. The experiments were made by Drs. C. Perrier and Emilio Segre.

Radioactive forms of element 61 were formed in experiments by both Drs. J. D. Kurbatov and Marion L. Pool and Drs. C. S. Wu and Segre

Radioactive element 85, whose isotope has an atomic weight of 211, was made by bombarding bismuth with 32,000,000 electron-volt alpha particles. Drs. Dale R. Corson, K. R. Mackenzie and Segre investigated its properties.

A radioactive form of element 87, given the name Ack, has been discovered resulting from the decay of actinium. This isotope discovered by Dr. M. Perey lives but a short time.



Atom Scientists Visit Exhibit As interested as any of the children who attended, scientists who helped develop the atomic bomb visit the American Chemical Society exhibit of how it was done. Left to right: J. R. Oppenheimer, Los Alamos, N. M., lab boss; G. T. Seaborg and J. C. Warner, who helped discover plutonium; Brig. Gen. K. D. Nichols and Prof. H. D. Smythe, who wrote the report on the bomb so many congressmen did NOT read.

3/27/46.

Atom May Reveal Secret of Life

Atomic research may have led scientists close to the secret of life. Discovery of a radioactive form of carbon may soon enable man to make synthetic food and fuel.

Dr. Glenn T. Seaborg made that prediction last night in a talk on "Future Possibilities of Radioactive Tracers" before the American Chemical Society's Pittsburgh Section.

Dr. Seaborg, a University of California chemistry professor, was a co-discoverer of plutonium, developed in atomic research.

400 Materials

"There are now over 400 known radioactive materials," he told the group. "The most important is Carbon 14.

Radioactive forms of matter, he said, will enable scientists to trace the course of the elements in living tissue. One puzzle this is expected to solve is the process of which green plants produce carbohydrates.

Understanding of this problem, he indicated, may lead to man-made synthetic food and fuel.

Will Give Information

Other radioactive elements may be "the most useful tool for research since discovery of the microscope," he predicted. The ability to "trace" their course in living tissue will give scientists valuable information on the way they act.

Artificial radioactive elements, he said, will be available in comparatively large quantities. In medicine, they may outmode the use of radium, which is very rare.

"The greatest gains to humanity from atomic research will result from the use of 'traceable' radioactive matter," he said.

N. Y. WORLD-TELEGRAM
Carbon 14 Held 3/27/46
Boon to Mankind

Special to the World-Telegram.

PITTSBURGH, March 27.—Carbon 14, a radioactive substance developed through atomic research, may be just what is needed to aid mankind in synthesizing food and fuel at will, Dr. Glenn Seaborg, co-discoverer of plutonium, said here last night.

Discussing future possibilities with radioactive tracers at a meeting of the physical chemistry division of the American Chemical Society's Pittsburgh section, Dr. Seaborg said there are now 400 known radioactive materials. Some of these, he said, are available for "atom-tagging" experiments in chemistry, physics, medicine and industry.

"Of these substances, which are expected to help solve many vital scientific problems and which may aid in the treatment of cancer and other diseases," he stated, "the most important is Carbon 14, an isotope or variant form with the same chemical properties as ordinary carbon but with a greater atomic weight."

What happens in photosynthesis, the process by which carbohydrates are formed in the chlorophyll-containing tissues plants exposed to light, is among the mysteries that may be cleared up by tagging atoms with Carbon 14 and observing their courses, he pointed out.

"It is not out of the question," he declared, "that a complete understanding of the photosynthetic mechanism might give men the ability to synthesize food and fuel at will, using this principle. This could give rise to a literal harnessing of the sun's energy. With the aid of Carbon 14 this might be accomplished."

Dr. Seaborg: I couldn't make it, but the reports say it was quite an affair.

JOHN R. GALLAHAN

ASSOCIATE EDITOR
CHEMICAL & METALLURGICAL
ENGINEERING

McGraw-Hill Publishing Co., Inc.
68 POST STREET
SAN FRANCISCO 4, CALIF.

(Release Friday Afternoon, March 29)
**CHEMICAL AWARD GIVEN
U. C. FOR ATOM WORK**

BERKELEY, Mar. 29.—An award for chemical engineering achievement has been presented to the University of California for its "unique and meritorious contribution to the atomic bomb project," by *Chemical and Metallurgical Engineering*, the scientific publication.

Dr. Glenn T. Seaborg, professor of chemistry, received the award on behalf of the University at a dinner sponsored by the publication in New York City.

Under the direction of Professor Wendell M. Latimer, dean of the college of chemistry, Professor Seaborg headed the University's chemical research on the atomic bomb project. In 1942 Professor Seaborg took several of his Berkeley campus associates to the University of Chicago, where he led the famous plutonium project in the Metallurgical Laboratory.

Professor Seaborg is the co-discoverer of the atomic bomb substance, plutonium, Element 94, and with his colleagues on the Berkeley campus he discovered Elements 93, 95 and 96.

Throughout the war Professor Seaborg coordinated work at Chicago and on the Berkeley campus. In this chemical research the atom-smashing cyclotron played a major role.

This Clipping From
**CHEMICAL METALLURGICAL
ENGINEERING
NEW YORK, N.Y.**

MAR -- 1946

**SURVEY OF NUCLEONICS AT
ACS ANNUAL MEETING**

SESSIONS dramatizing the impact of atomic power upon civilization will feature the 109th national meeting of the American Chemical Society which will be held in Atlantic City, April 8 to 12. The meeting, the first to be held by the Society since 1944, is expected to be the largest in the history of the American chemical profession.

The program will include a broad survey of nucleonics under the chairmanship of Dr. Glenn T. Seaborg, co-discoverer of plutonium and also of elements 95 and 96. Dr. Seaborg, a University of California chemistry professor, is in charge of plutonium research for the Manhattan Project at the University of Chicago Metallurgical Laboratory.

Nuclear power's far-reaching implications for mankind will be emphasized by an exhibit, the first of its kind ever staged, on the harnessing of this new form of energy, its use in the atomic bomb and its potential service in science and industry.

Peacetime applications of many other wartime advances will be discussed. Developments in plastics, petroleum, rubber, food, gas and fuel, medicinal chemistry, education and other fields will be reported in the several hundred papers to be presented at sessions of seventeen of the Society's professional divisions. More than 100 local sections of the Society will be represented.

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Circ. (D 21,687)

This Clipping From
EL PASO, TEX.
HERALD-POST

MAR 30 1946

'Tracer' Method Closes Last Gaps In Chemical Table

By Science Service

PITTSBURGH, March 30. — The production by artificial means of four chemical elements, number 43, 61, 85, and 87, now known to be extremely rare or non-existent in nature, has been made known by Dr. Glenn T. Seaborg, professor of chemistry at the University of California and co-discoverer of the elements plutonium, 95 and 94 during atomic bomb research.

Dr. Seaborg made the disclosure in an address to the physical chemistry section of the Pittsburgh section of the American Chemical Society.

With the manufacture and investigation of the properties of these four elements, all the gaps in the table of chemical elements have been closed.

Used 'Tracer' Method

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Radioactive forms of element 61 were formed in experiments by both Drs. J. D. Kurbatov and Marion L. Pool and Drs. C. S. Wu and Emilio Segre. This element is a rare earth.

Other Discoveries

Radioactive element 85, was made by bombarding bismuth with 32,000,000 electron-volt alpha particles. Its general behavior is that of a metal, with little resemblance to the other halogens, of which iodine is typical. Drs. Dale R. Corson, K. R. Mackenzie and Emilio Segre investigated its properties.

A radioactive form of element 87, given the name AcK, has been discovered resulting from the decay of actinium. This isotope, discovered by Dr. M. Perey, lives but a short time. It decays with negative beta particle emission with a half life of 20 minutes. As was expected, it behaves like a heavy alkali metal.

Unlimited Possibilities

Unlimited possibilities for the application of radioactive tracers to scientific problems and to the treatment of disease were foreseen by Dr. Seaborg. He said:

"Many biologists believe that artificial radioactivity has given biology and medicine," "what is probably the most useful tool for research since the discovery of the microscope, because almost all the elements and compounds in the biological system can be tagged and their course through living systems studied."

The chain reacting pile used in the production of plutonium for the manufacture of atomic bombs produces large amounts of neutrons of high intensity and as a result it is possible to produce in large quantity isotopes that are used as "tags" or "tracers."

Exciting Find

One of the most useful of the isotopes thus made is radioactive carbon 14. Since carbon is so important in the living world, being able to tell where a carbon atom travels and what it does by spying upon it with an apparatus that spots its explosive decaying will give scientists new information on what happens during living and chemical changes.

Radiophosphorus, radiosulfur and radioiodine are among the other radioactive isotopes that, according to Dr. Seaborg, will offer many opportunities for important research.

One exciting finding is that radiophosphorus accumulates in leukemic tissues, thus opening the possibility that it can be used in the treatment of this cancerlike disease of the blood cells.

Study Of Cancer

The study of cancer is another possible use of tracers.

"It has occurred to many investigators," Dr. Seaborg reported, "that it should be possible to synthesize some compound containing a radioactive substance, this compound having the property of being selectively absorbed by the cancerous issue, so that the radioactive rays can act directly at this spot without giving harmful effects on the body's healthy tissue."

MARQUETTE, MICH.

Club Hears

Dr. Seaborg

This Evening

DAILY MINING JOURNAL
4/1/44



DR. GLENN T. SEABORG

ISHPEMING, April 1—The Marquette Range Engineers club anticipates a record attendance at its meeting this evening when Dr. Glenn Seaborg and Mrs. R. C. Mahon appear to discuss their part in the development of the atomic bomb.

Members of the club are privileged to bring guests to the meeting.

Great interest attaches to the appearance of Dr. Seaborg, because he is a former resident of Ishpeming and a graduate of Ishpeming high school. His work in chemical research brought him into the field of the atomic bomb.

He is rated as one of the nation's leaders in the research field and has joined the staff of the University of Southern California to continue his experimental work.

Mrs. Mahon is the former Dr. Eleanor Conway, professor of anatomy, and she did some of the atomical research in the development of the Manhattan project.

Chemists Head For A. C. S. Meet

Biggest U. S. Chemical Convention Opens Monday

(Special to Journal of Commerce)

ATLANTIC CITY, N. J., April 4.—Chemists, chemical engineers and executives in the chemical industry from every part of the country are en route today for the five-day 109th national meeting of the American Chemical Society opening here Monday.

More than 10,000 scientists and management officials from large and small producing companies and representing every segment of the industry will attend the meeting which according to advance registrations tabulated yesterday will be the largest in the history of American chemistry.

Awards Made Monday

Registration will continue all day Sunday and Monday in Atlantic City's Convention Hall. The meeting gets under way at 2 P. M. Monday. At this general session Secretary of War Robert T. Patterson will speak on "The Chemist's Military Horizon" following the presentation of several awards including the Priestly medal, top A. C. S. medal award to Sir Ian Heilbron of the Imperial College of Science and Technology, London.

Division sessions begin Tuesday morning. Top interest is centered in the symposium on nuclear energy Wednesday morning. Sponsored by the division of physical and inorganic chemistry, Dr. Glenn T. Seaborg, co-discoverer of plutonium, will head the discussions. Four leading atomic scientists will point out the possibilities of harnessing this new source of power for industrial and other non-military uses.

The society's atomic energy exhibit will be displayed all week. In 13 panels, it shows how nuclear energy is developed and controlled, its use in the atomic bomb, and its potential application to industry and science.

High Polymer Forum

Six divisions of the society will join forces on Tuesday in a forum on high polymers which will outline the developments of multiple molecular structures in fibers, protective coatings, plastics, and rubbers. Further advances in rubber chemistry will be reported at the rubber division's sessions beginning Wednesday.

A symposium on influenza and other virus diseases on Friday will be the first ever held in the United States. The important gains in the war against influenza will be reported at this session of the division of biological chemistry.

At 8:30 Monday evening, a general mixer will be held on the main floor of Convention Hall following a social hour at 5:30 and several group dinners at 7:00 P. M.

10,000 Are Expected As ACS Meet Opens

Society's 109th National Session to Explore Impact of Atomic Energy

(Continued from Twenty-first Page)

Rosebank, S. I., vice president of the Perry-Austin Manufacturing Co.; Egbert W. Magruder of Keswick, Va., retired; Oscar W. Pickering of Ithaca, N. Y.; Carl F. Stahl of Pittsburgh, Pa., retired, and Albert P. Sy, professor of chemistry at the University of Buffalo.

One of the outstanding events on the five-day program will be a dinner Wednesday evening in honor of Dr. Charles L. Parsons, who retired last Dec. 31 after 38 years' service as secretary of the society and 14 as its business manager. Dr. Marston T. Bogert, professor emeritus of organic chemistry at Columbia University, will be toastmaster at the dinner in the Convention Hall ballroom, and among the speakers paying tribute to Dr. Parsons for his contributions to chemistry will be Dr. Eric Rideal, Fulmerian professor of chemistry at the Royal Institution, London, England, and president of the Society of Chemical Industry.

Two other leading foreign chemists, both Swiss, are to speak at the Atlantic City meeting. They are Dr. Leopold Ruzsicka of the Technischen Hochschule of Zurich, who will present a paper on "The Constitution of Triterpenes" before the Division of Organic Chemistry Thursday morning, and Dr. Tadeus Reichstein of Basle, who will address a luncheon of the Division of Sugar Chemistry and Technology Thursday.

Symposium on Nuclear Energy

Among the important discussions scheduled by the professional divisions of the society which are convening is a symposium on nuclear energy in which four of the nation's leading atomic scientists will outline probable non-military uses of this new source of power and will explain the significance of the large number of radioactive substances now available for experiments in chemistry, physics, medicine and industry.

Presiding at the symposium, which will be sponsored by the Division of Physical and Inorganic Chemistry on Wednesday morning, will be Dr. Glenn T. Seaborg, co-discoverer of plutonium, one of the atomic bomb's bases, and also of elements 95 and 96.

Dr. Seaborg, a University of California chemistry professor in charge of plutonium research at the University of Chicago Metallurgical Laboratory, will present a paper on "The Chemical and Radioactive Properties of the Heavy Elements." Other speakers will be:

ACS to Fete Him



DR. CHARLES L. PARSONS

Who will be honored by ACS at dinner Wednesday night. Dr. Parsons retired as secretary of the ACS at the turn of the year after 38 years of service.

Dr. W. F. Libby of the Institute for Nuclear Studies and Department of Chemistry at the University of Chicago, who will discuss "The Chemistry of Energetic Atoms Produced by Nuclear Processes"; Dr. Milton Burton of the Monsanto Chemical Co., Clinton Laboratories, Oak Ridge, Tenn., on leave from the University of Notre Dame, who will report on "Radiation Chemistry," and Dr. Charles D. Coryell of the same laboratories, on leave from Massachusetts Institute of Technology, whose topic will be "Radiochemistry and the Fission Products."

13-Panel Exhibit

Emphasizing the manner in which the atomic power development influences virtually all scientific deliberations today will be a 13-panel exhibit prepared by the society on the harnessing of nuclear energy, its use in the atomic bomb and its potential services in science and industry. This exhibit won wide acclaim when shown at the 20th Exposition of Chemical Industries in Grand Central Palace, New York, and in the Department of Commerce Building in Washington.

A three-day symposium on the latest developments in the field of antimalarial agents is another highlight of the program. Professor Ed. F. Degering of Purdue University,

Lafayette, Ind., chairman of the Division of Medicinal Chemistry, will preside at the symposium to be held tomorrow, Wednesday and Thursday. A total of 37 papers will be presented. The division also will hold general sessions on Thursday afternoon and Friday morning.

Proteins, amino acids and vitamins will be considered by the Division of Agricultural and Food Chemistry, specific topics including: "Proteins, Protein Hydrolyzates, and Amino Acids and Methods for Their Evaluation," tomorrow morning; "Chemical and Biological Utilization of Agricultural Products," tomorrow afternoon, and "Foods—Their Composition, Quality, Nutritive Value, and Factors Which Influence Their Preservation," Wednesday morning.

The Division of Biological Chemistry will conduct three symposia, the first, on "Clinical Biochemistry," being slated for tomorrow afternoon with Dr. Arnold E. Osterberg of Abbott Laboratories, Chicago, as chairman. Professor Vincent du Vigneaud, head of the Department of Biochemistry at the Cornell Medical College, will preside Wednesday afternoon at a symposium on "Metabolism of Acetic Acid," and the third symposium, on "Biochemical and Biophysical Studies in Viruses," will be held Friday under the chairmanship of Dr. Wendell M. Stanley of the Rockefeller Institute for Medical Research, who recently received the William H. Nichols Medal of the Society's New York Section for his virus discoveries.

Dr. Arthur Knudson of the Albany (N. Y.) Medical College, chairman of the Biological Chemistry Division, will preside at meetings on "Microbiology" tomorrow morning and on "Vitamins" Thursday morning, and at a general session Thursday afternoon. At the vitamin session Dr. Charles D. Robeson of Distillation Products, Inc., Rochester, N. Y., and James G. Baxter will report on "A New Vitamin A." The division also will hold a meeting on "Enzymes" Wednesday morning and will participate Thursday with the Division of Physical and Inorganic Chemistry in a symposium on "Interactions in Protein Solutions," with Professor E. J. Cohn of the Harvard Medical School presiding.

Training Doctors

Chemistry's vital role in the training of America's physicians and surgeons will be stressed at a symposium on premedical education to be held Thursday afternoon by the Division of Chemical Education in co-operation with Alpha Epsilon Delta, national honorary premedical fraternity. Dr. Maurice L. More, director of organic research at the Frederick Stearns & Co. Scientific Laboratories in Detroit, will preside.

United States Patent Commissioner Casper W. Ooms will discuss "The Patent System in the United States" and John C. Green of the Department of Commerce will report on the work of the Government's Publication Board in disseminating scientific data from

To Head Sessions, Receive Awards



DR. WENDELL M. STANLEY
Who will preside at symposium on biochemical and biophysical studies on viruses, Biological Chemistry Division, on Friday.



DR. DAVID E. GREEN
Winner of the Paul-Lewis Laboratories Award in enzyme chemistry, who will be honored at the session today.



DR. GLENN T. SEABORG
Co-discoverer of plutonium, who will preside at the ACS symposium on nuclear energy Wednesday, sponsored by the Division of Physical and Inorganic Chemistry.

Government-sponsored research and enemy sources at a symposium on "Technical Library Techniques" to be conducted by the Chemical Education Division tomorrow morning and afternoon. Norman C. Hill of the Pittsburgh Coke & Chemical Co. will preside. A third symposium on the chemist's professional and economic status will be held by the division on Friday, with Albert L. Elder of the Corn Products Refining Co., Chicago, as chairman.

A round-table discussion of "Fuel in Wartime Europe" will feature a meeting of the Division of Gas and Fuel Chemistry on Thursday, with A. C. Fieldner of the United States Bureau of Mines leading the discussion.

An innovation at the Atlantic City meeting will be a joint forum of six divisions on the subject of high polymers, the multiple molecular structures making up rubbers, fibers and plastics. The forum, to be held all day tomorrow and Wednesday morning, will be sponsored by the Paint, Varnish and Plastics Division, headed by Dr. Adolph C. Elm of the New Jersey Zinc Co., Palmerton, N. J., with the Cellulose, Colloid, Organic, Physical and Inorganic, and Rubber Divisions participating.

Dr. Paul J. Flory of the Good-year Tire & Rubber Co., Akron, Ohio, will preside at the first session of the forum, which will consider "The Physical Chemistry of Copolymers and Copolymerization." Chairman of the other sessions will be Dr. R. H. Ball of the Celanese Corp. of America, Newark, N. J. Dr. Ball also will preside at a meeting of the Paint, Varnish and Plas-

tics Division's Plastics Group Wednesday afternoon, at which recent plastics developments will be reviewed.

The latest improvements in synthetic rubber will be reported at meetings of the Rubber Chemistry Division Wednesday afternoon, Thursday and Friday, with Dr. W. A. Gibbons of the United States Rubber Co., division chairman, presiding. A total of 37 papers will be presented.

Also convening will be the Division of Analytical and Micro Chemistry, Sugar Chemistry and Technology, Petroleum Chemistry, Water, Sewage and Sanitation Chemistry, and History of Chemistry.

All sessions will be held in the Convention Hall except those of the Division of Rubber Chemistry, which will take place at the Hotel Ambassador. General headquarters for the meeting will be the Hotel Claridge. An employment clearing house to bring together employers, chemists and chemical engineers will be conducted daily on the main floor of Convention Hall.

Many group breakfasts, luncheons and dinners will be held under the auspices of the Society's professional divisions, college alumni associations and technical fraternities. Special arrangements have been made for a reunion of persons connected with Division 8 of the National Defense Research Committee during the war. This will take place at 5:30 P. M. today at the Jefferson Hotel. Tonight there will be a general get-together for Society members and guests at Convention Hall. A luncheon for all technical intelligence investigators



VINCENT DU VIGNEAUD

Professor of Cornell Medical College, who will preside at symposium on metabolism of acetic acid, Biological Chemistry Division, on Wednesday.

and Chemical Warfare Service, Quartermaster Corps, Medical Corps and Ordnance Department personnel who have been abroad will be held at the Hotel Madison Thursday.

During the five-day meeting 30 leading publishers will exhibit about 450 books on various phases of chemistry and chemical engineering at Convention Hall under the auspices of the Division of Chemical Education.

Science Service April 9, 1946

ATOMIC POWER FOR FUTURE SUPER-AIRLINERS FORESEEN BY PLUTONIUM DISCOVERER IF PEACE CONTROLS REALLY WORK

By DR. FRANK THONE
Science Service Staff Writer

ATLANTIC CITY, N.J. -- Uranium 235 and plutonium will power future super-airliners, if (and a very big if) successful international controls prevent diversion of atomic energy sources for purposes of war, prophesied Dr. Glenn T. Seaborg of the University of Chicago, co-discoverer of plutonium and of the new elements americium and curium.

"Denaturing" atomic energy materials, he told the American Chemical Society, will not turn the trick alone, Dr. Seaborg emphatically warned. It can only slow down possible conversion for military uses, but cannot wholly prevent it. For full control, to insure civilization's safety, only international agreements, firmly made and kept in good faith, will suffice. If this cannot be accomplished, it may be necessary to forbid completely all commercial applications of this revolutionary new energy source.

If the world can insure its own safety against misuse of atomic energy, revolutionary changes in industry such as the world has never seen are already at hand, the speaker declared. First will come application of atomic energy in large stationary plants, to generate electricity by driving turbine-connected generators. Then will come the propulsion of surface and submarine ships. Finally, after the atomic pile has been freed of the load of graphite now necessary for keeping the output of energy within safe bounds, the atomic-energy unit will sprout great wings and take to the upper air.

But none of these things can take place, without extreme peril to the whole world, until the necessary international controls can be worked out.

Science Service April 9, 1946

WHY RUBBER STRETCHES? — ANARCHY AMONG ITS MOLECULES

By Science Service

ATLANTIC CITY, N.J. -- Retention of its stretchability by rubber depends on the maintenance of a state of internal anarchy among its molecules, Dr. W. O. Baker and Dr. N. R. Pape, of the Bell Telephone Laboratories, reported to the American Chemical Society.

X-ray studies of natural rubber stretched and stretched again until it stiffened and lost its elasticity showed that the molecules had assumed an orderly, crystal-like pattern. Types of synthetic rubber that do not thus become brittle under strain showed X-ray patterns indicating that their molecules never became really orderly.

0007

OTHER EDITORS

**Chemists
See Things**

EL DORADO TIMES

American chemists have discovered, identified and investigated four substances that don't exist.

Dr. Glenn Seaborg, co-discoverer of plutonium and elements 95 and 96, explained this last week to the Pittsburgh section of the American Chemical Society: The substances were elements 43, 61, 85 and 87—"gaps" until now in the chemical table of discovered elements.

Earlier claims by chemists they had isolated these elements probably must be discounted now. They don't exist in nature. Seaborg's colleagues "created" them by smashing atoms of the elements' nearest weight-neighbors in the scale.

Such small amounts were created that they could not be examined chemically. But because they were artificially radio-activated they could be studied by their own radiation.

A layman may be pardoned for not exactly "getting" the above-related situation as set forth by Pathfinder magazine. But he is willing to permit chemists to have their little secrets and to play with the marvels which occur in the recesses of their laboratories. He knows that the wielders of tubes and retorts bring forth miracles that affect John W. Public mightily in his every-day life.

Probably a layman, without any chemical knowledge, will never exactly understand just how the atomic bomb came into being—or what makes it click. But he knows that it played a major part in winding up the Japanese war long before the anticipated time, and that the fate of the bomb as it is to affect the world in the future has aroused the greatest general discussion in a lifetime.

Chemists live to themselves in a world apart, but they have a habit of exerting a mighty influence on the people of the real world, their habits and customs.

WEST
PRESS
CLIPPING
BUREAU
KANSAS CITY, MO.
OF THE KAN

APR 10 1946
DODGE CITY, KA GLOBE

CHEMICAL AND
NEERING NEWS

**Seaborg Names
New Elements**

Americium and curium were proposed as the names for the two new elements 95 and 96 by Glenn T. Seaborg, speaking before the Symposium on Nuclear Chemistry at the Atlantic City meeting of the AMERICAN CHEMICAL SOCIETY on April 10.

In reviewing the discovery and chemical investigation of the transuranium elements, Seaborg, co-discoverer of plutonium and elements 95 and 96, said: "Elements 95 and 96 should, of course, have names and we propose the following in which these actinide elements are given names by analogy with the corresponding members of the lanthanide earths. We suggest for element 95, with its six 5f electrons, the name 'americium,' symbol Am; thus this element would be named after the Americas or New World, by analogy with europium, with its six 4f electrons, which was named after Europe. For element 96, with nine 5f electrons, we suggest 'curium,' symbol Cm, after Pierre and Marie Curie, historical leading investigators in the field of radioactivity, starting by analogy with gadolinium, containing seven 4f electrons, which recalls Gadolin, the great investigator of the lanthanide earths."

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This Clipping From
WASHINGTON, D. C.
PATHFINDER

APR 10 1946

Watch Closely!

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Earlier claims by chemists they had isolated these elements probably must be discounted now. They don't exist in nature. Seaborg's colleagues "created" them by smashing atoms of the elements' nearest weight-neighbors in the scale.

Such small amounts were created that they could not be examined chemically. But because they were artificially radio-activated, they could be studied by their own radiation.

Chart. A huge secret which may now stare science in the face, Dr. Seaborg added, is how plants use sunlight to produce carbo-hydrates. (General Motors Vice President C. F. Kettering assigned this to lab workers several years ago as an "ultimate" goal—and a good way to induce utterly random experimentation.)

Radio-activating "tracer" atoms in the plants, Seaborg said, may allow all the mysterious steps of the process to be watched as they occur.

Radio-active carbon, he added, already has served to "tag" bacteria which have absorbed it—to spy them out in action.

This Clipping From
ST. LOUIS, MO.
POST DISPATCH

APR 10 1946

Denaturing Can Slow, but Not Bar Atomic Energy Use for Purpose Of Destruction, Scientist Asserts

Dr. Glenn T. Seaborg, Co-discoverer of Plutonium, Says Problem Must Be Solved Politically on International Front Because Nuclear Power Will Be Used Industrially.

By RICHARD G. BAUMHOFF
Of the Post-Dispatch Staff.

ATLANTIC CITY, N.J., April 10.

A CAUTION that denaturing of the materials used for production of atomic energy—which has been achieved to make the new power available for beneficent purposes and unavailable for bombs or other weapons—cannot positively prevent eventual reconversion of the materials for war purposes was given here today by Dr. Glenn T. Seaborg, co-discoverer of plutonium.

Dr. Seaborg, who is with the metallurgical laboratory of the University of Chicago, which developed the production of plutonium, spoke before a division of the American Chemical Society in a symposium on nuclear chemistry.

He is one of the scientists signing the statement issued by the State Department yesterday, which explained why denaturing alone cannot make atomic warfare impossible. That statement appears elsewhere in this edition.

Dr. Seaborg said here that scientists agreed generally that denaturing only slowed down conversion of atomic energy materials from useful to destructive forms. He continued:

"Nevertheless, in my opinion, atomic energy will be used in industrial peacetime applications because of the advantages which it affords, and therefore it will be necessary to solve this problem politically on the international front. The solution probably lies in the development of an international control system based upon inspection to prevent the diversion of the material to illegal purposes.

"I believe that the report of the State Department consultants, in which there is proposed the Atomic Development Authority, where denaturing plays a part but is only one of many control measures, offers a very good practical plan for the international control of atomic energy, and every effort should be made to put this plan

into effect. If this problem cannot be solved, an alternative lies in foregoing the commercial use of this source of energy, a solution which it seems a pity to be forced to accept.

"Under any circumstances, we can say with certainty that this development will affect the lives

of every one of us and the importance of the problem which it raises cannot be over emphasized."

Power for Big Planes.

Dr. Seaborg agreed with the generally expressed scientific view that large-scale power and heat from atomic energy is feasible now. Likewise he agreed that the massive plants required made use for such things as automobiles impossible. However, he went somewhat further that some others have been willing to forecast, and said it was possible that the new power might become available for "very large airplanes" and for submarines as well as large surface vessels.

Plutonium, in the discovery of which Dr. Seaborg played a leading part, and its companion, neptunium, are among the newcomers in recent years in the periodic table of the elements. There are two still newer ones, discovery of which was announced by Dr. Seaborg last November, for which he suggested names today.

Uranium, basis of the work on atomic energy, was formerly the end of the table—element 92. Neptunium, 93; plutonium, 94, and the new elements, 95 and

96, all are transmutations of uranium—in effect, a modern realization of the ancient alchemist's dream of turning one element into another.

Dr. Seaborg, co-discoverer of 95 and 96, suggested that 95 be called Americium, in honor of the Americas, and 96 curium, in

honor of Pierre and Marie Curie, discoverers of radium. Chemical symbols, respectively, would be "Am" and "Cm." He noted that uranium, neptunium and plutonium were named respectively, after the planets Uranus, Neptune and Pluto.

In explaining why he and his associates proposed the new names, Dr. Seaborg said that the new elements, 95 and 96, and those immediately preceding them in the periodic table, have certain characteristics which make them resemble the so-called rare earths, elements 57 to 71, inclusive. He offered the hypothesis that the heavy elements at the high end of the table, beginning with actinium, No. 89, forms a rare-earth-like series.

The new names, he explained,

were developed by analogy with the corresponding numbers of the rare-earth series, which includes europium, 63, named for Europe, and gadolinium, 64, named for J. Gadolin, Finnish chemist who was the great investigator of the rare earths.

Americium and curium were found as a result of bombardment of uranium 238 and plutonium with high energy ions in Prof. Ernest Lawrence's cyclotron at the University of California.

Dr. Milton Burton of the Monsanto Chemical Co., who was associated with the Oak Ridge atomic bomb plant, told the same session that chemists may be able to change the properties of familiar solids at will as a result of techniques discovered in development of the bomb.

Under bombardment by fast neutrons, he said, certain solid materials, particularly the lighter elements, are so affected that some of their atoms become displaced from their normal positions, thus imparting entirely new properties to the substance. As an example he cited changes in electrical resistance, elasticity and heat conductivity caused in graphite.

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Cir. (D 95,070) (S 187,971)

This Clipping From

OMAHA, NEBR.
EVENING WORLD-HERALD

APR 10 1946

Bomb Group Sees Perils

Denaturing Is Called Partial Guard

Compiled from Press Dispatches.

A dozen atom bomb scientists Tuesday said in Washington that denaturing such explosives cannot alone eliminate dangers of atomic warfare, although it would make control more flexible.

Their statement was issued by the State Department, the Associated Press said.

"The report does not contend nor is it in fact true that a system of control based solely on denaturing could provide adequate safety," said the statement.

It said that removal of the denaturant, once it has been added to the explosive, must be done in plants of the general type of the Oak Ridge (Tenn.) atom bomb installation, though not so large.

Construction of such plants and their use "to process enough material for a significant number of atomic bombs would probably require not less than one or more than three years," the scientists said.

Dr. Glenn T. Seaborg, co-discoverer of plutonium, said Tuesday that unless effective international control of atomic energy was established "an alternative lies in foregoing the commercial use of this course of energy."

Asserting that such an alternative was a "solution which it seems a pity to be forced to accept," the University of Chicago scientist told the American Chemical Society in a meeting at Atlantic City, N. J.:

"In my opinion, atomic energy will be used in industrial peacetime applications because of the advantages which it affords, and therefore it will be necessary to solve this problem (of control) politically on the international front."

Meanwhile, Maj. Gen. Thomas F. Farrell, who directed the bombing of Hiroshima and Nagasaki, predicted that the Bikini Atoll tests will lead to an American Navy of giant submarines.

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Cir. (D 3,840) (S 3,840)

This Clipping From

MURFREESBORO, TENN.
NEWS JOURNAL

APR 10 1946

New Elements Given Names

Chicago, April 10—(AP)—The man who won fame as the co-discoverer of plutonium, one of the bases of the atomic bomb, is back in the limelight again. This time, Dr. Glenn Seaborg, a young professor of chemistry, has added two new names for two new elements.

The elements, 95 and 96, have just been added to the expanding periodic table. Dr. Seaborg calls them Americium and Curium. Speaking before the American Chemical society at Atlantic City, he announced the names, Americium for element 95, and Curium for 96, in an address on the heavy elements.

Dr. Seaborg is only 33 years old. At present he is on leave to the University of Chicago's metallurgical laboratory from the University of California.

The announcement of the discovery of the new elements was made last November. Associated with Dr. Seaborg in the discoveries were Ralph James, Leon Morgan and Albert Ghiorso.

Dr. Seaborg was named the outstanding young man of Chicago for 1945 by the Chicago Junior Association of Commerce for his discoveries.

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This Clipping From

POWER
NEW YORK, N. Y.

APR -- 1946

Sessions dramatizing the impact of atomic power upon civilization will feature the 109th national meeting of the American Chemical Society at Atlantic City, N. J., April 8-12. Program will include a broad survey of nucleonics, the new field of scientific endeavor dealing with release of energy from nucleus of the atom, under chairmanship of Dr. Glenn T. Seaborg, co-discoverer of plutonium, one of the atomic bomb's bases, and also of elements 95 and 96. Dr. Seaborg, a University of California chemistry professor, is in charge of plutonium research for Manhattan Project at University of Chicago Metallurgical Laboratory. Nuclear power's far-reaching implications for mankind will be emphasized by an exhibit on the harnessing of this new form of energy, its use in the atomic bomb and its potential service in science and industry.

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Cir. (D 18,876) (S 43,408)

This Clipping From
LEXINGTON, KY.
HERALD

APR 1 0 1946

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(Pathfinder Magazine)

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Tel. CHelsea 3-8860

Cir. (D 85,046)

This Clipping From
WASHINGTON, D. C.
NEWS

APR 1 0 1946

Plutonium Co-Finder Predicts Atom Planes

ATLANTIC CITY, N. J., April 10—Uranium 235 and plutonium will power future super-airliners, if (and a very big if) successful international controls prevent diversion of atomic energy sources for purposes of war, the co-discoverers of plutonium prophesied today.

Speaking before ~~Chemical Society~~, the University of Chicago's Dr. Glenn T. Seaborg, predicted: First could come application of atomic energy in large stationary plants, to generate electricity by driving turbine-connected generators; then, propulsion of surface and submarine ships; finally, after the atomic pile has been freed of the load of graphite now necessary for keeping the output of energy within safe bounds, the atomic-energy unit could sprout great wings and take to the upper air.

NEW YORK SUN 11/10/46

URGES WORLD ATOM CONTROL

Dr. Seaborg Gives Chemists Alternative Solution.

Atlantic City, April 10 (A. P.).

—Dr. Glenn T. Seaborg, co-discoverer of plutonium, said today that unless effective international control of atomic energy was established "an alternative lies in foregoing the commercial use of this course of energy."

Asserting that such an alternative was a "solution which it seems a pity to be forced to accept," the University of Chicago scientist told the American Chemical Society in an address prepared for a symposium on nuclear energy:

"In my opinion, atomic energy will be used in industrial peacetime applications because of the advantages which it affords, and therefore it will be necessary to solve this problem (of control) politically on the international front. The solution probably lies in the development of an international control system based upon inspection to prevent the diversion of the material to illegal purposes."

One of a group of atomic scientists who yesterday released a statement in Washington declaring that "denaturing" of atomic materials cannot of itself eliminate the dangers of atomic warfare, Seaborg told the chemists:

"Although the State Department has recently revealed that there exists the possibility of denaturing nuclear energy source isotopes so as to render them relatively unsuitable for use in atomic bombs without appreciably diminishing their efficiency for use in atomic energy machines, there is general agreement among scientists that such steps can only slow down the conversion from useful to destructive forms of this material."

In the Washington-released statement signed by Seaborg and eleven other scientists, the assertion was made that "the (State Department) report does not contend nor is it in fact true that a system of control based solely on denaturing could provide adequate safety."

Also Gives Report.

In a report to the same symposium, Dr. Milton Burton of the Monsanto Chemical Company, who was associated with the Oak Ridge atomic project, said chemists may be able to change the properties of familiar solids at will as a result of technics discovered in the atomic bomb development.

Under bombardment of fast neutrons, he said, certain solid materials—particularly the lighter elements—are so affected that some of their atoms become displaced from their normal positions, thus imparting entirely new properties to the material.

In graphite, for example, he said, changes in electrical resistance, "elasticity" and heat conductivity have been brought about by neutron bombardment.

Envisioning a day when atomic energy units would employ "essentially pure plutonium or uranium-235" and would be considerably smaller than the present huge uranium-graphite structures, Dr. Seaborg said:

"Even if the atomic source never provides cheaper energy than is available from common sources, it will still have an important future because of its advantages as a compact and almost inexhaustible source of power. . . ."

Seaborg, who last fall announced the existence of the new elements 95 and 96—radioactive elements that somewhat resemble the so-called rare earths—today proposed formal names for them.

He suggested that element 95 be called "Americium," with the symbol "Am" in honor of the Americas, and that element 96 be called "Curium," with the symbol "Cm" in honor of Pierre and Marie Curie, who obtained radium from pitchblende.

World Must

Curb Atoms

Control Vital, Seaborg Tells Chemists

By FRANK CAREY

Associated Press Science Reporter

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Asserting that such an alternative was a "solution which it seems a pity to be forced to accept," the University of Chicago scientist told the American Chemical Society meeting in the Municipal Auditorium, in an address prepared for a symposium on nuclear energy.

"In my opinion, atomic energy will be used in industrial peacetime applications because of the advantages which it affords, and therefore it will be necessary to solve this problem (of control) politically on the international front. The solution probably lies in the development of an international control system based upon inspection to prevent the diversion of the material to illegal purposes."

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(In the Washington-released statement signed by Seaborg and 11 other scientists, the assertion was made that "the (State Department) report does not contend nor is it in fact true that a system of control based solely on denaturing could provide adequate safety.")

May Shift Any Solid

In a report to the same symposium, Dr. Milton Burton of the Monsanto Chemical Co., who was associated with the Oak Ridge atomic project, said chemists may be able to change the properties of familiar solids at will as a result of techniques discovered in the atomic bomb development.

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He suggested that element 95 be called "Americium," with the symbol "AM" in honor of the Americas; and that element 96 be called "Curium," with the symbol "CM" in honor of Pierre and Marie Curie, who obtained radium from pitchblende.

Atom Scientists Caution Public

WASHINGTON, April 9 (INS).—A committee of atomic scientists reported today that denaturing of atomic energy materials could not be relied on, "of itself," to eliminate the dangers of atomic warfare.

The report was issued by a committee called by Major General L. R. Groves, head of the Manhattan District Project, which developed the bomb.

PUBLIC MISUNDERSTANDING

The report was issued to correct "some public misunderstanding of what denaturing is and of the degree of safety that it could afford."

The statement, issued at the State Department, recalled that denaturing of atomic explosives had been brought to public attention in a recent State Department report on the subject. It noted that for security reasons, certain technical facts could not be made public.

Today's statement indicated that within one to three years the secret of making atomic explosives from denatured material might be discovered.

URANIUM ESSENTIAL

It emphasized that without uranium as a raw material, there was no foreseeable method of releasing atomic energy, since thorium could be used only in conjunction with uranium.

The scientists who signed the report were: Dr. L. W. Alvarez, of the University of California; Dr. R. F. Bacher, Cornell University; Dr. M. Benedict, of the Kellogg Corp.; Dr. H. A. Bethe, Cornell University; Dr. A. H. Compton, Chancellor of Washington University, St. Louis; Dr. Farrington Daniels, University of Wisconsin.

Also Dr. J. R. Oppenheimer, University of California; Lieutenant Colonel John R. Ruhoff, Mallinckrodt Chemical Works; Dr. G. T. Seaborg, University of California; Dr. F. H. Spedding, Iowa State College Laboratory; Dr. C. A. Thomas, Monsanto Chemical Co., and Dr. W. H. Zinn, director of University of Chicago's Argonne Laboratory.

THE EVENING BULLETIN, Phila., Wed., Apr. 10, 1946

GERMAN CHEMISTS NOT AHEAD OF U. S.

But Visitor after War says in Some Fields they Led Americans

Atlantic City, April 10.—A U. S. technical investigator, one of a group who were sent to Germany at the end of the war by the Chemical Warfare Service, declared today that on the broad over-all picture German chemical developments were not ahead of ours.

The investigator, R. L. Murray, vice president in charge of research at the Hooker Electrochemical Co., Niagara Falls, reported his findings today at a meeting of the division of industrial and engineering chemistry of the American Chemical Society's 109th national meeting.

Murray declared that the Germans did some of their most outstanding work as a result of shortages of petroleum, oils and fats.

Another example of shortage-born developments, he said, was their large scale use of two processes for the production of liquid fuels, starting from coal and other non-petroleum raw materials.

"More than 600,000 tons of synthetic liquid fuels and gasoline a year were produced at Leuna alone," Murray pointed out, "so it is easy to see why such plants were incessantly bombed, and the resulting loss of production was a major factor in Germany's defeat."

Murray said that though the Germans made strides in the development of polymers, resins and plastics, they had nothing which remotely approached in size our huge and quickly built synthetic rubber program.

Presiding at a nuclear chemistry symposium, Dr. Glenn T. Seaborg, of the University of Chicago, co-discoverer of plutonium, one of the atomic bomb bases, warned today that unless effective international control of the use of fissionable substances is established, the many commercial, peacetime applications of the new atomic energy source may have to be banned altogether to prevent diversion of the material to destructive purposes.

"Although the State Department has revealed recently that there exists the possibility of 'denaturing' these nuclear energy source isotopes so as to render them relatively unsuitable for use in atomic bombs," Seaborg declared, "there is general agreement among scientists that such steps can only slow down the conversion from useful to destructive forms of this material and cannot prevent their being used in atomic bombs."

Dr. Seaborg announced that plutonium and uranium-235 can be used in atomic energy machines with entire safety, through the slow neutron chain reaction.

"However, it is unfortunately true," he declared, "that these same materials can be converted to the atomic bomb form in which the fast neutron chain reaction is utilized. Nuclear energy in this latter form is suitable only for destructive or war purposes."

Dr. Seaborg declared that large-scale production of heat and power from the nuclear fission reaction already is feasible from a scientific and engineering point of view, and eventually will be produced cheaply enough to compete with coal and oil.

TWO NEWEST ELEMENTS GIVEN NAMES AT CHEMICAL MEETING

BY WATSON DAVIS
Director, Science Service

ATLANTIC CITY, N. J., April 10.—The two newest chemical elements to be discovered, Nos. 95 and 96, were christened "americium" and "curium" by their codiscoverer, Dr. Glenn T. Seaborg, of the Metallurgical Laboratory, University of Chicago, in an address before the American Chemical Society meeting here today. Made synthetically from uranium and plutonium as a consequence of

the atomic bomb research, americium and curium were manufactured in the University of California cyclotron at Berkeley by bombarding U238 and Pu239 with 40,000,000 electron volt helium ions. Dr. Seaborg announced the discovery of these two elements last fall.

The chemical symbols of the new elements will be Am and Cm.

Element 95 is named after the Americas, or the New World, and element 96 is named after Pierre and Marie Curie, the great leaders in the study of radioactivity.

When neptunium, element 93, and plutonium, element 94, were discovered they were named after the two planets Neptune and Pluto, beyond the planet, Uranus, in the solar system, after which element 92, uranium, was named. But when two more elements were manufactured, there were no more planets of the solar system after which to name them.

So Dr. Seaborg, who was also codiscoverer of plutonium, used in the atomic bomb, used analogy with corresponding elements in the periodic table to guide him in naming his new chemical babies.

He found that the new elements were members of a series of elements, which he called the actinide series because its first member is actinium. This corresponds with the series of chemical elements known as the lanthanide earths, which begin with lanthanum.

The shells or layers of electrons in the atoms of these elements have similarities. Elements 95 has

six of what the chemists call 5f electrons and corresponds to the element europium, with six 4f electrons, which was named after Europe. This suggested to Dr. Seaborg naming element 95 after the Americas. Element 96 has seven 5f electrons while gadolinium, with seven 4f electrons, was named after Gadolin, a great investigator of the rare earths. This suggested naming 96 after the Curies.

Dr. Seaborg is professor of chemistry at the University of California on loan to the atomic bomb project and he will shortly return to Berkeley.

Hot atoms from atomic nucleus transformations follow new rules of combination, Dr. W. F. Libby of the University of Chicago told the Chemical Society's symposium on nuclear chemistry.

These hot atoms, with energies 10,000 times greater than those involved in ordinary chemical reactions, fly through solutions at enormous speed, due to recoil from such nuclear explosions as the emission of gamma rays. Such speeds, Dr. Libby reports, make the particles collide with the atoms of the solution and ricochet like bullets hitting a wall.

New types of chemical combination, resulting from these high energy collisions, are rather simple and predictable, according to the Chicago scientist. They can be used to make a radioactive hot atom replace an ordinary atom, thus tagging a compound whose subsequent progress through chemical reactions or life processes can be watched by following its radioactive behavior.

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Cir. (D 116,398)

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NEWS

APR 10 1946

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APR. 10, 1946
MILES CITY, MONT. STAR

Co-Discoverer Gives Views

By FRANK CAREY

Associated Press Science Reporter

ATLANTIC CITY, N. J., April 10—

(AP)—Dr. Glenn T. Seaborg, co-discoverer of plutonium, said today that unless effective international control of atomic energy was established "an alternative lies in foregoing the commercial use of this course of energy."

Asserting that such an alternative was a "solution which it seems a pity to be forced to accept," the University of Chicago scientist told the ~~American Chemical Society~~ in an address prepared for a symposium on nuclear energy:

"In my opinion, atomic energy will be used in industrial peacetime applications because of the advantages which it affords, and therefore it will be necessary to solve this problem (of control) politically on the international front. The solution probably lies in the development of an international control system based upon inspection to prevent the diversion of the material to illegal purposes."

One of a group of atomic scientists who yesterday released a statement in Washington declaring that "denaturing" of atomic materials cannot of itself eliminate the dangers of atomic warfare, Seaborg told the chemists:

"Although the state department has recently revealed that there exists the possibility of 'denaturing' nuclear energy source isotopes so as to render them relatively unsuitable for use in atomic bombs without appreciably diminishing their efficiency for use in atomic energy machines, there is general agreement among scientists that such steps can only slow down the conversion from useful to destructive forms of this material."

In the Washington-released statement signed by Seaborg and 11 other scientists, the assertion was made that "the (state department) report does not contend nor is it in fact true that a system of control based solely on denaturing could provide adequate safety."

00085

APR 11 1946

Scientists In Atom-Bomb Research Used 'Invisible Scales to Weigh Invisible Materials'

2 New Elements Are Detected, Society Told

Atlantic City, April 10 (AP)—Absolute detection of two new elements—assuring for the first time the filling-in of gaps in the world's table of known elements—was announced today in a disclosure of hitherto top-secrets in the nation's atomic-energy research.

The elements—still not named—are Nos. 43 and 61, and they are unstable fission products of uranium, detected during research on the atomic bomb.

Definite pinning down of the two new elements—long known to exist theoretically and even assigned tentative properties by some investigators—was disclosed during an American Chemical Society symposium on nuclear chemistry.

Used Invisible Scales.

At the same symposium it was disclosed also that:

1. During the titanic research to produce the atomic-bomb element, plutonium, scientists actually "were using invisible scales to weigh invisible material."

2. As a corollary to atomic-bomb research, scientists by the bombardment of graphite (carbon) with neutrons produced a nonradioactive form of carbon with entirely different properties from the original target—thus opening an avenue toward changing the properties of familiar solids at will.

The announcements were made by a group of top-ranking atomic scientists who said the Manhattan Project just a few days ago had undertaken steps to allow the release of carbon basic information not directly connected with military aspects.

Isolation Assured.

Dr. Charles D. Coryell of the Monsanto Chemical Company, who worked at the Oak Ridge atomic plant, announced the absolute detection of Elements 43 and 61 by himself and a group of coworkers.

Dr. Glenn T. Seaborg of the University of Chicago, codiscoverer of plutonium, later told reporters that while elements 43 and 61 have not been formally isolated, "It is known exactly where they are and the state of their radioactivity." He said definite isolation was assured.

Dr. Coryell said that prior to the atomic-project research, the postulated elements 43 and 61 had been assigned the names "masurium" and "illinium," respectively, but he said their names now would be changed to conform with the demonstrated properties of the elements.

Dr. Seaborg, giving details on plutonium hitherto secret, said that before the element was even produced from uranium by the magic of atomic alchemy, it was necessary to plan a separation technique that would free the proposed plutonium from the grip of uranium.

Bombard Uranium.

In working out this technique, he said, scientists were able to produce minute quantities of plutonium by bombarding a uranium sample in a cyclotron. The quantities produced were invisible to the naked eye and, to weigh them, scales were built which registered weight by twisting a tiny quartz fiber.

This fiber also was so small that the naked eye couldn't see it, and Dr. Seaborg declared:

"We were using invisible scales to weigh invisible materials."

The report on changing the properties of graphite by neutron bombardment was made by Dr. Milton Burton of Monsanto and Oak Ridge, who plans soon to return to the University of Notre Dame.

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220 W. 19th St., NEW YORK 11, N.Y.
Tel. CHelsea 3-8860

Cir. (D 127,124)

This Clipping From
BIRMINGHAM, ALA.
NEWS

APR 11 1946

Taming Of A-Energy Seen For Industry

BY THOMAS R. HENRY
Science Editor, North American
Newspaper Alliance

WASHINGTON, April 11—Industrial use of atomic power is feasible already. And eventually it will be cheap enough to compete with coal and oil.

This was announced before the American Chemical Society here yesterday by ~~Dr. Glenn T. Seaborg~~, of the University of Chicago, co-discoverer of plutonium, the synthetic element of the atomic bomb.

"Large scale production of heat and power from the nuclear fission reaction already is feasible from a scientific and engineering point of view," he said.

"But there is no possibility that atomic power ever can be used to propel automobiles because of the huge steel or concrete shielding needed for protection from this radiation.

"But large stationary power plants which might be used for space heating or in which the heat energy in the form of a hot fluid might be used in some industrial process, are definite possibilities. The hot fluid might be used to operate a turbine which in turn could transfer its energy to an electrical generator.

"It may be possible eventually to use atomic energy in large mobile units such as sea-going vessels and even very large airplanes. The atomic energy units of the future will use, essentially, pure plutonium or uranium 235 and therefore will be considerably smaller than the present huge uranium-graphite structures."

At the same time, Dr. Seaborg announced names for two other synthetic elements built up from uranium, "Americium" and "Curium," the later in honor of the Curies, discoverers of radium.

These two elements, the discovery of which he announced last Fall do not have explosive potentialities like plutonium. They seem to be in the general class of the so-called "rare earth" elements.

4/11/46

U. OF C. CHEMIST GIVES NAME TO 2 NEW ELEMENTS

BY ROY GIBBONS
[Chicago Tribune Press Service]

Atlantic City, N. J., April 10—Dr. Glenn T. Seaborg of the University of Chicago metallurgical laboratories today named two new elements which he and a group of associates isolated last year while doing research on the atomic bomb in Chicago.

The first of these elements, No. 95, Dr. Seaborg said in an address before the 109th meeting of the American Chemical society, will be known as Americium in honor of the Americas and the new world.

On element 96 he conferred the name, curium, as a tribute to the memory of Pierre and Marie Curie, historic discoverers of radium.

Dr. Seaborg, who more frequently is referred to as the co-discoverer of plutonium which powered at least one of the atomic bombs dropped on Japanese forces, said he was not permitted to disclose whether the two new elements are fissionable [able to be split] for release of atomic energy.

In commenting on a war department report which Tuesday disclosed that the American state department's previously suggested method for denaturing plutonium consists in adding an isotope [chemical twin] to make the explosive fit only for commercial use, Dr. Seaborg said the denaturing process can slow down atomic energy sources, but cannot prevent their conversion into atomic bomb materials.

The army's report, authorized by Maj. Gen. Groves, director of the Manhattan project and development

DAY BY DAY on the FARM by BOB BECKER

April 10, 1946.

THE crows which are on the farm this spring [and there are plenty of them] have been demonstrating recently that they still know most of the tricks in the bird book. When we were on the farm the other day we counted 19 of these big, black birds in one field which appeared to have been worked over rather recently. A little later we asked one of the men what had been planted in this particular field. He said they had just sowed oats there and without doubt the crows were going over the field to eat the seed that had not been covered up. The birds were quick to discover that in a freshly seeded oat field they could pick up a little food, so they went to work.

All of the men on the farm are commenting on not only the number of crows but their boldness. Not only the Wheaton farm but others all thru the middle west are playing host to large numbers of crows because during the war years landowners and sportsmen did not have the time or the ammunition to exercise control.

Has a Long Holiday

Conservation departments which used to lend a hand in crow control also were handicapped in their operations. Consequently, Mr. Crow has enjoyed a long holiday, and pop-

ulations have increased in most localities.

Besides the flock that we watched in the recently planted oat field, we saw crows in many other parts of the farm. There was quite a spring convention of these birds being held around the big pond when we checked on the activities of a kingfisher there. Two active members of the crow conclave put on an exciting fight for us while we were near the pond. This pair [probably two male birds] soared high into the air as they sparred with each other.

Corn Plants Pulled Up

Last year the farm workers were quite concerned about the crow population when the corn began sprouting because the birds went into the fields and had a great time pulling up the tender new corn plants. With a large number of birds on the farm again this spring, it may be necessary to get out the shotguns and reduce the number of these birds before the corn fields get green.

The juncos hadn't left the farm for the north when we walked thru the fields the other day. We found one flock of about 20 of these neat little birds along a row of wild crab trees. They have been on the farm all winter, but are scheduled to go back north to nest sometime this month. While we were watching the juncos a sparrow hawk flew by. But the small birds showed no alarm whatsoever.

supervisor of the atomic bomb, stresses the fact, said Dr. Seaborg, that "denaturing, the valuable in adding to flexibility of a system of controls, cannot of itself eliminate dangers of atomic warfare."

In addressing the same symposium on nuclear chemistry, Dr. Milton Burton, University of Notre Dame faculty member now on leave

with the army's atomic bomb project at Oak Ridge, Tenn., said chemists soon may be able to change at will the properties of familiar substances by a method discovered during research on atomic energy.

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220 W. 19th St., NEW YORK 11, N.Y.
Tel. CHelsea 3-8860

Cir. (D 20,128)

This Clipping From
NEW YORK, N. Y.
JOURNAL OF COMMERCE

APR 11 1946

Atomic Controls Urged by Chemist

Seaborg Reports Need of International Board to Prevent Misuse

(By a Staff Correspondent)

ATLANTIC CITY, N. J., April 10.—Early development of an international control for atomic energy was called for by Dr. Glen T. Seaborg of the Metallurgical Laboratory of the University of Chicago at an American Chemical Society symposium on nuclear chemistry.

Calling attention to a warning issued Tuesday by the State Department that the denaturing of fissionable materials "cannot of itself eliminate the dangers of atomic warfare", he emphasized the fact that the denaturing process will not completely preclude making atomic weapons but will only reduce their effectiveness.

More Detailed Information

At the four-hour symposium, at which Dr. Seaborg presided, chemists were given more detailed insight into the developments of the atomic energy projects than has been revealed since the work was first clothed with secrecy in 1942. Most of the information imparted by Dr. Seaborg and by other speakers was made available for discussion by these men only last week when it was reclassified by the committee of scientists guarding the nation's top scientific secrets.

Saying that there was no real conflict between the position of the State Department regarding the possibilities of denatured atomic energy sources as bomb materials and his own views, Dr. Seaborg declared that the denaturing process can only delay but not prevent conversion of these materials into bombs.

In the case of countries which might have atomic energy plants it would take several months to convert denatured atomic materials to explosive types, he said. Where such plants did not exist from one to three years might be required.

Might Ban Industrial Use

Since re-naturing the denatured material is only a matter of time, Mr. Seaborg asserted that commercial applications of atomic energy may have to be banned altogether to prevent the diversion of the materials to bombs unless effective international control is established. An international control system based on inspection to prevent the diversion of the material to illegal purposes presents the best solution to the problem, he declared.

Foregoing the use of atomic energy for commercial purposes was deplored by the scientist and he added: "In my opinion, atomic energy will be used in industrial peacetime applications because of the advantages which it affords and therefore it will be necessary to solve this problem politically on the international front."

"Prospects are not good for an immediate solution to the problem," Charles D. Coryell of the Monsanto Chemical Co., Linton Laboratories at Oak Ridge, Tenn., said. He added that while the possibilities of an early international agreement was clouded because of involved world affairs, that the long-term outlook was more hopeful.

Competition by Fuels

Large scale production of heat and power from the nuclear fission reaction is already feasible, Dr. Seaborg said. Eventually the new form of energy will be produced cheaply enough to compete with coal and tar.

"There is no possibility that atomic power can be used to propel ordinary automobiles," he declared. "The huge steel or concrete shields needed for protection from the radiation of any atomic energy machine preclude such uses." Such machines require a three-foot thick shield of lead. From four to five feet of concrete or steel are necessary.

"Large stationary power plants which might be used for space heating or in which the heat energy in the form of a hot fluid might be used in some industrial process are definite possibilities."

"The hot fluid," he explained, "might be used to operate a turbine which in turn could transfer its energy to an electric generator, thus converting the energy to a useful form."

Marine Use Possible

It might be possible eventually to use atomic energy in large mobile units, such as seagoing vessels, including submarines, and very large airplanes, he predicted.

The atomic energy units of the future will in most cases utilize pure plutonium or uranium-235 and therefore will be much smaller than the present huge uranium-graphite structures.

"Even if the atomic source never provides cheaper energy than is available from common sources," Dr. Seaborg stated, "it will have an important future because of a compact and almost inexhaustible source of power no other fuel can come close to equaling."

He added that atomic energy will probably be able to compete with common sources of power price-wise eventually. The world's resources of uranium are abundant, he pointed out and a sufficient quantity has been found to insure that enough can be obtained for all industrial requirements of the future.

Use of Heavy Water

It was predicted that heavy water will be used in place of graphite in the process which will cut down the size of the piles required for producing atomic energy.

By introducing nitrogen compounds into the uranium piles, Carbon 14, a highly useful organic chemical, will also be obtained.

Chemists may be able to change the properties of solids by a method discovered in the atomic energy developments. Dr. Milton Burton, Monsanto Chemical Co., declared, "This development has not been precisely intimated."

For example, Dr. Burton said, changes in electrical resistance, elasticity and heat conductivity can be effected in graphite by introducing fast neutrons which knock the atoms of the graphite out of their normal positions. Those atoms then behave like foreign bodies within the normal structures with a resultant change in properties.

In what direction such property changes occur, Dr. Burton was not permitted to say. As a case in point, whether the heat conductivity of graphite is increased or decreased by the method is still top drawer secret.

Yield of Fission Types

Information on the yield of various fission types was given by Dr. Coryell. Yield, he pointed out, varies with the weight of the product formed and the way the yield varies must be known in dealing with the radioactive materials formed in atomic energy machines.

Fission of the lighter elements possible, he declared but elements lighter than iron will not produce atomic energy.

Isolation in the near future in pure form of elements 43 and 96 in the atomic series was predicted by Dr. Seaborg as a result of the atomic energy investigation.

These elements do not exist in nature. Their occurrence in radioactive in fission will give an impetus to the study of inorganic chemistry, he added.

Suggests Naming Elements

Dr. Seaborg recommended that the recently discovered elements 95 and 96 be called "Americium" and "Curium" respectively.

In a statement issued yesterday through Dr. Charles A. Thomas, member of the ACS board of directors the society put itself on record as in favor of international control of atomic energy. Comment on any of the several proposals for international control that have been made was withheld.

However, the statement said, "we unqualifiedly feel that the report on the international control of atomic energy issued under date of March 16, by the State Department warrants the best thought of the United States as we move toward a Broad policy."

The statement further recommended that the overall supervision of atomic research and development provided for in any national legislation be placed in a civilian commission including qualified scientists.

New York Times.

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NEW YORK, THURSDAY, APRIL 11, 1946.

ATOM ENERGY SEEN IN CREATIVE ROLE

Continued From Page 1

setts Institute of Technology, respectively.

By means of the radiations released through atomic fission, Dr. Burton reported, chemists may be able to change the properties of familiar solids at will. The most interesting new development, he said, was the discovery of the "discomposition" of solids by fast neutrons.

"Atoms, particularly of the lighter elements and their compounds," Dr. Burton said, "are ejected from their lattice positions and come to rest much like foreign bodies at interstitial points. New properties are thus conferred on the solid.

"In graphite, for example, changes in electrical resistance, elasticity and thermal conductivity have been produced."

Professor Coryell revealed that more than 150 radioactive substances not previously known in nature had been isolated and identified as the fission fragments of uranium 235. Many of these promise to find great usefulness in many fields.

Among the fragments produced by the fission of uranium 235 are isotopes (twins) of two of the missing elements, elements 43 and 61. For the first time, Dr. Coryell reported, these two missing links in the periodic table of the elements have been obtained in weighable amounts.

Element 43, now known as masurium, named after the Masurian Lakes in former East Prussia, and elements 61, now known as illinium after Illinois, will be renamed, it was revealed by Professor Seaborg. Similarly, the two other missing elements, 85 and 87, now known as virginium and alabamine, after the States of Virginia and Alabama, will also get new names.

It is now universally agreed among chemists, it was pointed out, that earlier claims to the discovery of these four missing elements, which led to their present

nomenclature, were based on mistaken identifications.

Elements 95 and 96, the two newest trans-uranium elements to be created, have been named, respectively, Americium, after the Americas, and curium, after Pierre and Marie Curie, discoverers of radium, it was announced by Professor Seaborg, the chemical symbols for these new elements are A M and C M. Americium is pronounced Ameristum.

"Hot" atoms, resulting from the transformation of the atomic nucleus, have energies 10,000 times greater than the energies involved in ordinary chemical combinations, and follow new rules of combinations, it was reported at the symposium by Dr. Libby.

Dr. Seaborg said that while "denaturing" atomic energy materials can slow down their conversion for use into atomic bombs for one to three years, it is only one of several control measures proposed by the Board of Scientific Consultants to the Secretary of State's committee on atomic energy.

"It will be necessary to solve the atomic energy problem politically on the international front," he said. "The solution probably lies in the development of an international control system based upon inspection to prevent the diversion of the material to illegal purposes.

"As to the ways in which atomic energy can be used industrially, large-scale production of heat and power from the nuclear fission reaction already is feasible from a scientific and engineering point of view, and eventually the new form of energy will be produced cheaply enough to compete with coal and oil.

"There is no possibility that atomic power ever can be used to propel ordinary automobiles because of the huge steel or concrete shielding needed for protection from the radiation of any atomic energy machine, but large stationary power plants which might be used for space heating or in which the heat energy in the form of a hot fluid might be used in some industrial process are definite possibilities. It may be possible even-

tually to use it in large mobile units, such as seagoing vessels, including submarines and very large airplanes.

"Even if the atomic source never provides cheaper energy than is available from common sources, it will still have an important future because of its advantages as a compact and almost inexhaustible source of power."

NEW YORK Herald Tribune



Friday, April 12, 1946

Owned and published daily by New York Tribune Inc., a New York corporation. Ogden Reid, President; Helen Rogers Reid, Vice-President; William E. Robinson, Second Vice-President; Stanley D. Brown, Secretary; A. V. Miller, Treasurer. Address 230 West 41st St., New York City (18).

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Americium and Curium

With the isolation by Dr. Glenn T. Seaborg of Elements 95 and 96, and with the accurate identification, by Dr. Charles T. Coryell and others, of Elements 43, 61, 85 and 87, the periodic table—certainly one of the most wonderful as well as one of the most fertile structures of scientific reason—stands complete at last. This particular achievement was only a by-product of the work on the atomic bomb, and now that research has flung its bold frontiers so much farther into the mysteries of nature, perhaps the filling of the table is mainly of historical interest. But it is impossible not to feel a certain excitement at the beauty and precision with which this famous speculation, launched by Mendeleev and others three-quarters of a century ago, has reached its ultimate completion and justification.

It began with realization of the curious fact that the elements, supposedly indivisible, immutable, unique building stuffs of the cosmos, actually appeared to run in families, and the families themselves to repeat themselves. Mendeleev arranged the elements in his periodic table of groups of eight, each group repeating in some measure characteristics of the corresponding member of the preceding groups. There were many gaps in the table; there were also serious discrepancies and anomalies. Yet, the suggestion of an underlying, mysterious rhythm in the structure of nature, of some rigid mathematical relationship where one would expect only random differences, remained. It was the periodicity of the periodic table which was so challenging to the creative curiosity of nineteenth-century science. Such a challenge could not go unanswered.

Gaps in the table were rapidly filled by discovery. Discrepancies were attacked and removed, and in the removal the founda-

tions of the modern knowledge of atomic structure were laid. The theory of the atomic nucleus and its electron shells was beautifully evolved from the hints of the table; the mystery was slowly solved, and when the discovery of radioactivity and the radioactive elements provided fresh weapons, the mathematicians and physicists and chemists were ready to use them. We are far beyond the periodic table now. But as the last of its ninety-six members is fitted neatly into the theoretical position one has

the sense of reaching the end of a great story, and of another great demonstration of the marvelous symmetry of nature.

Dr. Seaborg, following a precedent set earlier in the table, has named Element 95 Americium, after the New World, and Element 96 Curium, after the Curies. The names aptly signalize America's part in completing the table and also the fact that it was the great international of science which built the structure. Utilizing that heritage, we have produced the atomic bomb; we also have opened vast avenues which unfettered science can explore. It is our part to see that the one does not destroy all hope of the great advances which may be looked for from the other.

Miami, Fla.
News
4-12-46

Industrial Use Of Atom Power Possible Now, Scientist Says

By THOMAS R. HENRY

Science Editor, North American Newspaper Alliance

WASHINGTON, April 12.—Industrial use of atomic power is feasible already. And eventually it will be cheap enough to compete with coal and oil.

This was announced before the American Chemical society here today by Dr. Glenn T. Seaborg of the University of Chicago, co-discoverer of plutonium, the synthetic element of the atomic bomb.

"Large-scale production of heat and power from the nuclear fission reaction already is feasible from a scientific and engineering point of view," he said.

"But there is no possibility atomic power ever can be used to propel ordinary automobiles because of the huge steel or concrete shielding needed for protection from the radiation.

"But large stationary power plants which might be used for space heating or in which the heat energy in the form of a hot fluid might be used in some industrial process, are definite possibilities. The hot fluid might be used to operate a turbine which in turn could transfer its energy to an electric generator.

"It may be possible eventually to use atomic energy in large mobile units such as sea-going vessels and even very large airplanes. The atomic energy of the future will use, essentially, pure plutonium or uranium 235 and therefore will be considerably smaller than the present huge uranium graphite structures."

At the same time, Dr. Seaborg announced names for two other synthetic elements built up from



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ISHPEMING, MICH
IRON ORE
4/13/46

DR. SEABORG NAMES TWO NEW ELEMENTS

Americium! Curium!

Two new names for two new elements.

Names for the two new elements, 95 and 96, which were recently added to the expanding periodic table by Dr. Glenn T. Seaborg, former Ishpeeming resident, on leave to the University of Chicago's metallurgical laboratory from the University of California, were proposed by the discoverer Wednesday.

Dr. Seaborg, speaking before the American Chemical society at Atlantic City, announced the names, americium for element 95, and curium for 96, in an address on the heavy elements.

Americium, designating the Americas or the New World, and curium, in honor of Pierre and Marie Curie, the historical leading investigators in the field of radioactivity, will be symbolized by Am and Cm, Dr. Seaborg stated.

He suggested americium and curium for the actinide elements 95 and 96 as an analogy with the corresponding members of the lanthanide earths. Element 95, with its six 5f electrons, was called americium by analogy with europium, with six 4f electrons, which was named after Europe.

For element 96, containing seven 5f electrons, he suggested curium as an analogy with gadolinium, containing seven 4f electrons, named in honor of Gadolin, the great investigator of the rare earths.

Announcement of the discovery of the new elements was made last November. Associated with Dr. Seaborg in the discoveries were Ralph A. Jamer, Leon O. Morgan, and Albert Ghiorso.

The elements were found as a result of the bombardment of uranium 238, the abundant isotope of that element, and plutonium 239 with high energy helium ions, or alpha particles, of 40 million

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This Clipping From
ATLANTIC CITY, N. J.
UNION

APR 13 1946

Chemical Convention
Draws ACHS 'Chemists'

Many chemistry students have had the opportunity of hearing talks by famous chemists at the convention of the American Chemical Society now meeting here. Of particular interest was the symposium on nuclear chemistry Wednesday morning. The talks were very technical and often above the understanding of high school students, but nevertheless the students were impressed by the recent progress made in nuclear research.

Dr. Glenn T. Seaborg lectured on the trans-uranium elements, neptunium and plutonium of which he was instrumental in the discovery. He also told about elements 95 and 96, which have been named Americium, after America, and Curium, after the Curies, who discovered and studied radium. Neither of these have been produced in any appreciable quantities. Dr. Seaborg revealed much information about the atomic bomb which had been held in the strictest secrecy until a few days ago.

Dr. Charles D. Coryell, of the Massachusetts Institute of Technology, gave a talk about the splitting of atoms and radioactive isotopes of many elements. He told about many of the elements that have been broken up and what their end products were.

Dr. Milton Burton, of Notre Dame, lectured on radiation chemistry and the unbelievable amount of energy released. Dr. W. F. Hibby of the University of Chicago, talked about excited atoms produced by nuclear processes.

N. Y. TIMES 4/14/46
Chemist's Convention

From every State, from the great university and industrial laboratories, nearly 9,000 chemists convened last week in Atlantic City for the American Chemical Society's first meeting since September, 1944. The scientists included many who had made major contributions toward winning the war. One of these was Prof. Glenn T. Seaborg of the University of California, co-discoverer of Elements 94 (Plutonium), 95 and 96. At the meeting he officially named Element 95 Americium (pronounced "amerisium") and 96 Curium. Privately, scientists in the know had dubbed them "delirium" and "pandemonium."

Some of the war's topmost secrets of chemical and biological warfare were discussed for the first time in public; many of them promised useful applications in medicine, industry and agriculture. In one of the "now-it-can-be-told" symposia, the chemists learned that the splitting of Uranium 235 provides at least 160 new products, many of which may find highly important uses. From another field of research, which the Army had kept tightly secret, came an announcement of four new drugs which may help eradicate malaria, a disease which afflicts nearly half of the world's population, including an estimated 4,000,000 in the United States.

N. Y. TIMES 4/14/46
NOTES ON SCIENCE

Elements 95 and 96 Are Named—
Yeast Acid Aid to Longevity

NEW ELEMENTS—

Elements 95 and 96, which do not occur in nature and which were produced by Drs. Glenn T. Seaborg, R. A. James, L. O. Morgan and A. Ghiorso, have been named "americium" and "curium" (after the Curies). They are what physicists call "transuranic" elements. If planets are discovered beyond Pluto (from which plutonium takes its name) they are almost certain to be called "americium" and "curium." Seaborg and his colleagues produced the new elements by bombarding U-238 (the ordinary form) and plutonium 239 with 40,000,000 electron-volt helium particles. The chemical symbols of the new elements will be "Am" and "Cm." Seaborg suggests that "americium" be pronounced not as if the "c" were a "k" but as if it were an "sh" as in "wish." We predict that the second "i", as in the case of "aluminium," will be dropped in this country, so that we shall all be saying "americum" as if the "c" were a "k".

The Wonderful Pile

General Leslie Groves, Grand Panjandrum of military atomics, made a minor concession to the cause of science. The Oak Ridge Laboratory, he said last week, was working on an experimental plant for producing atomic power. It should be finished in a year.

But many scientists, though interested in atomic power, are more interested in the radioactive materials from the Oak Ridge chain-reacting pile. These promise a scientific revolution.

The pile, a rather simple device, consists of uranium rods stuck through a large mass of graphite. Some uranium atoms—those with an atomic weight of 235—split in two, producing energy and shooting out neutrons, which are subatomic particles with zero electric charge. These are the lifeblood of the pile.

Swarming through the pile in billions of billions, these neutrons stir up a storm of unrest among the atoms of every element in it. Some are turned into atoms of different chemical elements, some into different isotopes of the same element. Nearly all are "hot," shooting out rays and energy. Every element is made radioactive.

Atomic Doodling. So far, only a few scientists connected with the Manhattan Project have been allowed to experiment freely with the pile's products. But outsiders, letting their imaginations soar, have dreamed up many uses: one possibility, a radioactive lamp that might glow for months or years.

Some substances in the pile give off gamma rays (X rays). Scientists see no reason why they should not be used to take pictures of infected teeth or flaws in steel castings.

Seaborg Tells. Until recently, atomic doodlers had little real information. But last week, Glenn T. Seaborg, codiscoverer of plutonium, and leading chemist of the Manhattan Project, released a gob of it. Said Seaborg: "It is not at all out of the question that the greatest gains to humanity from the atomic energy develop-

ment will result from the widespread use of tracers. . . ."

By "tracers" Seaborg meant radioactive tags attached to chemical elements. Radioactive carbon, for instance, follows ordinary carbon through the most complicated chemical reactions, and its progress can be traced by its radioactive effects. Thus if an infinitesimal part of the carbon in sugar is made radioactive and fed to a human being, physiologists can follow it through the digestive tract, into the blood, the muscles, and out through the lungs as carbon dioxide.

Every element and compound can be tagged in this way. Within a few years, tracers should be: 1) marking the progress of raw materials through industrial processes, 2) "banding" bacteria as if they were robins, 3) even following the motion of water deep underground.

Medicine, too, said Seaborg, can use the magic pile, both for studying diseases and for curing them. Radioactive iodine, for instance, follows ordinary iodine through the human body. Its rate of accumulation in the thyroid gland (shown by holding a radiation counter near the throat) diagnoses accurately the condition of the gland in goiter and related diseases (*see MEDICINE*).

All this and more could be forecast, but so far, the Manhattan Project is grimly guarding its piles, and burying their products underground.

This Clipping From
ZANESVILLE, OHIO
TIMES RECORDER

APR 16 1948

2 Elements Discovered In Atom Test

ATLANTIC CITY, April 16 (AP)

—Absolute detection of two new elements—assuring for the first time the filling—in of gaps in the world's table of known elements—was announced recently in a disclosure of hitherto top-secrets in the nation's atomic energy research.

The elements—still un-named—are numbers 43 and 61, and they are unstable fission products of uranium, detected during research on the atomic bomb.

Definite pinning down of the two new elements—long known to exist theoretically and even assigned tentative properties by some investigators—was disclosed during an American Chemical Society symposium on nuclear chemistry.

At the same symposium, it also was disclosed that:

1. During the titanic research to produce the atomic-bomb element plutonium, scientists actually "were using invisible scales to weigh invisible material."

2. As a corollary to atomic bomb research, scientists by the bombardment of graphite (carbon) with neutrons produced a non-radioactive form of carbon with entirely different properties from the original target—thus opening an avenue toward changing the properties of familiar solids at will.

The announcements were made by a group of top-ranking atomic scientists who said the Manhattan project just a few days ago had undertaken steps to allow the release of certain basic information not directly connected with military aspects.

Dr. Charles D. Coryell of the Monsanto Chemical company who worked at the Oak Ridge atomic plant, announced the absolute detection of elements 43 and 61 by himself and a group of co-workers.

Dr. Glenn T. Seaborg of the University of Chicago, co-discoverer of lutonium, later told reporters that while elements 43 and 61 have not been formally isolated "it is known exactly where they are and the state of their radioactivity." He said definite isolation was assured.

Dr. Coryell said that prior to the atomic project research, the postulated elements 43 and 61 had been assigned the names "masurium" and "illinium," respectively. But he said their names now would be changed to conform with the demonstrated properties of the elements.

Dr. Seaborg, giving details on plutonium—hitherto secret, said that before the element was even produced from uranium by the magic of atomic alchemy, it was necessary to plan a separation technique that would free the proposed plutonium from the grip of uranium.

In working out this technique, he said, scientists were able to produce minute quantities of plutonium by bombarding a uranium sample in a cyclotron. The quantities produced were invisible to the naked eye, and to weigh them, scales were built which registered weight by twisting tiny quartz fiber.

This fiber also was so small that the naked eye couldn't see it, and Dr. Seaborg declared:

"We were using invisible scales to weigh invisible materials."

The report on changing the properties of graphite by neutron bombardment was made by Dr. Milton Burton of the Monsanto Chemical company and Oak Ridge project, who plans soon to return to the University of Notre Dame at South Bend, Ind.

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This Clipping From
TORRINGTON, CONN.
REGISTER

APR 16 1948

MIRACLES AHEAD

Through the expansion and application of man's knowledge of atomic energy the chemists, who have already transformed the world man lives in, will accomplish new miracles for the benefit of mankind. They will be able to give basic elements properties they never before possessed and thus create new materials with strange and wonderful qualities.

That much is clear to the layman, though he cannot hope to understand the processes by which this further progress will be brought about, from the reports of the symposium on nuclear chemistry that took place the other day at the meeting of the American Chemical Society at Atlantic City. Conducted by Prof. Glenn T. Seaborg of the University of California, co-discoverer of plutonium, the symposium was a startling revelation of how far chemistry has already gone along this new road.

For example, it is now known that radiations released by atomic fission can change the properties of familiar solids. By exposing graphite to these radiations its electrical resistance, elasticity and thermal conductivity can be altered. What results is a new substance that will be useful for purposes not served by the original element. As more than 150 radioactive substances previously unknown have been isolated as fission fragments of uranium 235, it is plain that science already has a host of new materials, with which to work and will have more.

The fact that four elements already named will be given new names as a result of the advances made in the study of nuclear energy helps to emphasize the importance of the strides made during the war period. Chemistry is acquiring not only more but better knowledge and the results will certainly be a tremendous surge forward in the years to come.

This Clipping From
MIDDLETOWN, CONN.
PRESS
APR 16 1946

Discovery of Element 61 20 Years Ago Is Mistake

CHICAGO, April 16.—(UP)—A Nuclear expert has revealed how re-search on the atomic bomb proved that University of Illinois chemists made a mistake 20 years ago when they announced the discovery of a new element.

Prof. Glenn T. Seaborg, of the University of California on leave of absence with University of Chicago's metallurgical laboratory, said the atomic bomb helped blast a theory once advanced by Prof. B. Smith Hopkins and University of Illinois chemistry colleagues.

In 1926 the Illinois chemists announced their belief that they had found element 61 in a pure state. They called it illinium.

With increasing knowledge of radioactive elements, chemists began to doubt that illinium existed in nature. Dr. Charles B. Coryell, of Massachusetts Institute of Technology, last week furnished proof to the American Chemical Society that element 61 ~~cannot be found in nature. It is artificially radioactive and unstable, he said.~~

Coryell told a Nuclear Symposium, headed by Dr. Seaborg, that he found element 61 among the unstable, radioactive by-products of the production of plutonium, the world's greatest explosive.

CHICAGO SUN 4/16/46

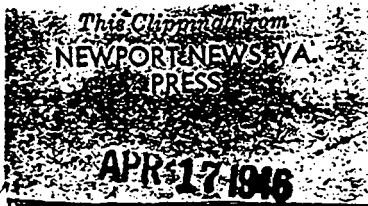
Fencing Knowledge In

MILITARY censorship clouded an otherwise pleasant christening last week. Dr. Glenn T. Seaborg of the University of Chicago metallurgical laboratories, leader in the discovery of the two newest known chemical elements, announced to the American Chemical Society that their names would be Americium and Curium. But he was not at liberty to answer a question bearing on their atomic properties.

The fact that an eminent scientist is unable to discuss his researches fully among his fellows is repugnant to the ideals of a democratic nation. Such hobbles on free interchange of knowledge must be swept away, both within this country and between all men and all nations.

In themselves, Americium and Curium are evidence of the way horizons are pushed back before the advance of research. They are Nos. 95 and 96 of the elements. Yet in the 1941 edition of the *Encyclopedia Britannica* one may read: "The number of elements is limited. Reference to the periodic classification shows that only 92 elements up to the heaviest, uranium, can possibly exist."

Man sets his own limitations on the scope of his knowledge. Those which are erected by fear, as in the case of military restrictions, are more dangerous than those set up by incomplete understanding.



Why Not Try Faith?

By J. SHENTON LODGE

The announcement by the American Chemical Society, during symposium of nuclear chemistry at Atlantic City recently, of the discovery of two new elements during research on the atomic bomb, fills further the gaps in the table of the world's known elements.

Dr Glenn T. Seaborg of the University of Chicago, and one of the discoverers of plutonium, stated that, while the new elements had not been formally isolated, "it is definitely known exactly where they are and the state of their radio-activity." Their early isolation was confidently prophesied Dr. Seaborg fur-

ther revealed the amazing fact that, during the experiments which produced the atomic-bomb element of plutonium, scientists "actually used invisible scales to weigh invisible material."

In the world of the spiritual, as in the realm of science, there seem to be elements which have not been successfully isolated so that they can be utilized in the service to common humanity of which they are capable. We know where they are, but have not yet harnessed their fullest power. There seems to be something in the idea of religion which the world has missed.

Whatever else history may record concerning the people of America in this generation, it will have to say that they have lived well-lived far beyond the experience of other lands. We have lived to such fullness that our abundance is now the sole hope of a hungry world. True, we have experienced difficulties through years of peace and war, depression and prosperity. At times, we have reached for the stars, and found them to be but burned-out cinders in our hands. We have dug deeply for that which, at the moment, we esteemed as treasure, and wallowed in a slough of despond from which we difficulty in extricating ourselves. We have pursued ideals, only to stumble and fall, and pick ourselves up again to pursue other ideals. But, through it all, we have lived, and lived well. No

SCIENCE
The two new elements, 95 and 96, were given names by Glenn T. Seaborg at the meeting of the Physical and Inorganic Division of the American Chemical Society meeting at Atlantic City on 10 April. He recommended that 95 be called "americium" with the symbol, Am, after the Americas, and that 96 be called "curium" with the symbol, Cm, after the Curies. Dr. Seaborg also recommended that the soft "c" be used in the pronunciation of americium, but some of his hearers thought that it would not be long until the second "i" will be dropped and the pronunciation changed, in the United States at least, following the history of aluminium.

generation has experienced such fullness of life as we. Yet there seems to be something big, vital and important which we have failed to grasp, and the lack of it leaves us not entirely satisfied, the more so because we are not quite sure, apparently, what it is that we have missed.

Religion must now learn even as science, how to use the invisible scales of the human heart to weigh the unseen, spiritual realities of life.

spiritual. There are elements of our religion which have not been properly revealed to the world, although we know exactly where they are and the state of their spiritual activity.

The church of our day has performed physical and material miracles through its campaigns, its drives and its crusades, its revivals and the world has profited by its herculean efforts in these days of world need. The church would do well now, to strive more energetically to fill some of the gaps in the table of its spiritual elements. Unity of mind, heart and purpose transcending sectarian divergencies of dogma is one. A closer intimacy with the spirit of God on the part of all its people is another.

One vital thing we have missed is something which the worshippers of all the churches hear proclaimed in each service. It is in the benediction of the church—"The Communion of the Holy Spirit." America almost boastfully proclaims "In God We Trust," yet lacks that priceless element of intimacy with God in its planning.

We seem to have tried almost everything else—why not try faith?

This Clipping From
SPOKANE, WASH.
SPOKESMAN REVIEW

APR 20 1946

PLANT SCALE-UP PUT OVER ATOM

ATLANTIC CITY, April 19.—The largest industrial scale-up in history, a jump in size of 10 billion times from a tiny pilot plant, was a major factor enabling the United States to produce the atomic bomb substance, plutonium, in the relatively short period of three years, Dr. Glenn T. Seaborg, professor of chemistry at the University of California, staid today.

Speaking at a meeting of the American Chemical society here, Dr. Seaborg, a co-discoverer of plutonium as well as elements 95 and 96 and a leader of the atomic bomb project dealing with that substance, pointed out that the ordinary industrial scale-up from a pilot plant is about 10 times.

Plan Worked Perfectly.

While major difficulties are encountered in the 10 times scale-up, the 10 billion plutonium scale-up from ultra-microchemistry to the 400 million dollar Hanford (Wash.) plant was accomplished without major alterations of plan. From the beginning the Hanford plant was able to produce plutonium at the efficiency suggested by the pilot plant.

Dr. Seaborg said Dr. P. L. Kirk, biochemist on the Berkeley campus of the University of California, played a major role in the early chemistry of plutonium, when he designed the equipment necessary to work with the all but invisible amounts of the material. Dr. Kirk, in addition to being a pioneer in ultra-microchemistry, is noted for his work in the solution of crimes by the laboratory analysis of tiny bits of evidence, such as hair, blood droplets, etc.

Dr. Kirk designed test tubes with an inside diameter of 1/250th to 1/25th of an inch. The weights of solids tested were from one-tenth to 100 micrograms; by comparison, a United States ten-cent piece weighs about 2,500,000 micrograms.

Exploding ATOMS

May Aid Study of Cancer, Explain Synthesis of Leaves

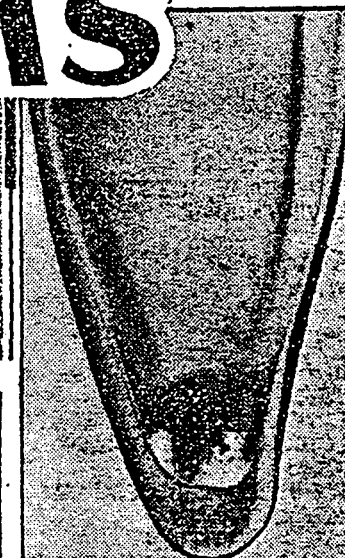
By WATSON DAVIS
Director, Science Service

Exploding atoms, by-products of the atomic bomb, promise to discover some of the world's major scientific secrets. These include how the green leaf synthesizes food and fuel, what makes cancer cells run wild, how the minute cells at the very beginning of a human life know what to do, just what happens in some of the major industrial processes such as cracking oil to obtain gasoline.

The atom bomb is revolutionary and world shaking. The use of artificial radioactive isotopes for tracer and atom tagging experiments in chemistry, physics, biochemistry, and medicine, may be even more world shaking. The new tools which are being used are varieties of chemical elements called isotopes. Carbon 14, a radioactive isotope of the ordinary carbon which composes so much of the world we live in, is now to be had as a by-product of the atomic bomb research. It is made by transmutation of nitrogen 14 bombarded by neutrons.

"A whole vista of opportunity is opened up as the result of the availability of the C-14 isotope," according to Dr. Glenn T. Seaborg, co-discoverer of the bomb element, plutonium, and the newer elements known to chemists as numbers 95 and 96. Professor of chemistry at the University of California, Dr. Seaborg is engaged in atomic research at the Metallurgical Laboratories at the University of Chicago.

"Organic chemists, biochemists, physiologists and the men of medicine," Dr. Seaborg reported



to the American Chemical Society meeting at Pittsburgh, have dreamed for years of the day when a radioactive isotope of carbon suitable for tracer investigations should become available."

The first and most obvious application in organic chemistry for C-14 would, in Dr. Seaborg's opinion, be a study of the rearrangements that take place in organic molecules. "There are a number of reactions," he says, "in which carbon atoms or groups of carbon atoms move from one part of a molecule to another. The question of just how this migration is accomplished has been a subject for discussion among organic chemists for many years. By labelling the migrating groups in certain positions," by introducing radioactive carbon atoms into the molecule, it should be possible to determine the precise sequence of events in such a reaction.

Several Carbon Isotopes

Carbon, whose normal atomic weight is 12, has other isotopes as well. There is a heavy, stable variety, C-13, which can be detected in compounds by its greater weight. C-13 can also be used to replace C-12, and its ultimate place in the new compound determined.

"Actually these isotopes complement each other," says Dr. Seaborg, "and it is very fortunate that both are available. There now exists the interesting possibility of tagging each of two different carbon atoms in a molecule or system, and then simultaneously observing the course of each."

Still a fourth variety of carbon is known, C-11, which is radioactive but has a very short period of activity, so that its travels cannot be followed over as long a period as can those of C-14. Nevertheless, Dr. Martin D. Kamen and the late Dr. Samuel Ruben of the University of California, and Prof. William Z. Hassid, formerly of the University of California and now at Washington University, St. Louis, were able to use radioactive C-11 in a study of photosynthesis in which considerable progress was made.

"Radioactive carbon dioxide," states Dr. Seaborg, "was fed to the unicellular green alga *Chlorella* and also to higher plants under various controlled conditions in the light as well as in the dark. The results obtained so far have been rather surprising. The higher plants and the algae reduce carbon dioxide in the dark. This process takes place concurrently with the release of carbon dioxide by respiration, so that the net effect is an evolution of carbon dioxide."

To Find Use of Carbon

The part of the plant to which the radioactive carbon atoms travelled was examined to try to find the chemical compound into which it had been built in the process of photosynthesis.

"Attempts to identify the radioactive substances formed in the dark and in the light have been thus far unsuccessful. It is of considerable interest to note that formaldehyde, which has played a prominent role in many proposed mechanisms, was not identified from the radioactive carbon dioxide introduced. Experiments with the ultra-centrifuge and diffusion methods indicate the average molecular weight of the radioactive molecules to be about 1,000, which explains the failure to identify chemically these molecules with any small molecules."

Can Use Hydrogen 3

Radioactive isotopes of all the chemical elements are now known, and those of several besides carbon are contributing to our newer knowledge of life processes. Hydrogen 3, for example, may be introduced into many organic molecules, and followed through a series of shifts in much the same way as carbon 14, except that it is somewhat more difficult to detect.

"Radiophosphorus has been the most widely used of all the artificially prepared radioelements as a tracer for metabolic studies in biological systems," says Dr. Seaborg. "The distribution of administered phosphorus in human and animal tissues has been extensively studied."

A single dose of disodium phosphate tagged with radiophosphorus has been found to accumulate to the greatest extent in the bones, next in the muscle and so on in decreasing order in liver, stomach and small intestines, blood, kidneys, heart and least of all in the brain. However, other experiments showed that in cases of leukemia the abnormal tissues accumulated unusual amounts of radiophosphorus. This opens the possibility that cancer may be treated by radioactive elements which concentrate and give out their beneficial rays in the very tissues which the rays are planned to treat.

Concentration of a certain element in one part of the body is well known in the case of iodine, which is absorbed to a large extent by the thyroid gland, even though the absolute amounts of iodine used by the body are extremely minute. Radioactive iodine in an appropriate combination may be swallowed by a patient who has placed a Geiger counter, which detects radioactive rays, near his throat.

Jagged Atoms in Thyroid

The arrival of the jagged atoms of iodine in his thyroid will promptly make itself known on the instrument. The differences in metabolism rate for the various types of thyroid activity characteristic of patients with different thyroid activity are easy to determine by this simple and direct method of measurement.

"An interesting piece of work to the comparative biologist," comments Dr. Seaborg, "was done by Dr. Aubrey Gorbman, of Wayne University, who found in certain invertebrates having no thyroid gland, that iodine is nevertheless concentrated in a marked fashion in a part of the

organism whose function was not previously known. It is, therefore, this primitive organ that is probably the predecessor of the thyroid gland in higher animals."

May Explain Brown Eyes

From the utilization of tagged atoms in every-day life-processes, the next step is to the migrations of atoms in newly forming embryos. "It is not difficult," says Dr. Seaborg, "to imagine ways in which the use of radioactive tracers will contribute to the solution of fundamental problems in the field of genetics, although some of the concepts are vague at the present time as to the actual planning of the experiments."

"It is evident, for example, that some causal relation must exist between the gene (or genes) for brown eyes, let us say, and the actual deposition of pigment in the cells of the iris. This problem has already been attacked by Dr. George W. Beadle of Stanford University and his associates by classical methods, but the availability of radioactive isotopes should make the solution of the problem much easier.

"Not unrelated to this problem, but in the field of embryology, is the problem of the 'organizer,' the substance or substances responsible for guiding the course of cellular differentiation in the developing embryo. The nature of this substance or substances is only incompletely understood, and its detailed method of action unknown. Here again radioactive tracers may be expected to facilitate the investigation of this problem.

How an Amoeba Moves

"Radioactive isotopes will also contribute to future advances in investigations dealing with such fundamental problems as the mechanism for the transformation of chemical energy to mechanical movement in living things. Thus today, no one knows quite what brings about a constriction of a muscle fiber, or even what mechanism is responsible for the movement of an amoeba.

"A possibility, which may sound quite startling, is that of tagging bacteria with radioactive



Leaf mechanism for taking carbon dioxide from the air and turning it into food and fuel through use of the sun's energy is shown in this picture of the underside of a castor bean leaf. This photograph (top left) by Jon D. Dooms of Benton, Ky., won a prize in Nature Photography at the Buffalo Museum of Science. Dr. Glenn T. Seaborg of the University of California, co-discoverer of the bomb element and the newer elements numbers 95 and 96, is shown explaining the manufacture of plutonium from uranium (top right) to a group of high school students at the recent Science Talent Institute held in Washington, D. C. One of the first pure compounds of plutonium, the bomb element, ever isolated (bottom left) is shown as a cloudy mass resting on the bottom of a micro test tube, not much larger than a human hair. About 10 micrograms of dark brown neptunium dioxide (bottom right), the first compound of this element to be isolated from uranium bombarded with neutrons from a cyclotron, are shown beside part of a dime. Photographs of the rare elements are from Dr. Seaborg. Through the researches that produced these new elements, light is being shed on how the leaf utilizes the sun's power.



This does appear to be feasible and to open great possibilities in the study of disease. In fact Prof. Israel Chaikoff and Dr. Alexander Kaplan of the University of California have made a beginning by tagging the tuberculosis bacillus with radioactive phosphorus in some experiments which have not yet been brought to completion.

"Many more possibilities for the use of radioactive isotopes in biochemical and physiological work might be suggested, but those given above suggest typical possibilities. Obviously, many of these problems are of profound significance in terms of human welfare.

How Oil Is Cracked

But the biological field, full of possibilities as it is, is not the only one where the new techniques can bring valuable new information. "With respect to chemical problems of direct interest to industries," says Dr. Seaborg, "many examples could be cited. Among these may be mentioned studies, with C-14, of the mechanism of catalytic cracking, isomerization and alkylation of hydrocarbons which are of profound interest to the oil industry.

"The future," Dr. Seaborg concludes, "seems to hold unlimited possibilities for the application of radioactive tracers to scientific problems. It is certain that the applications of radioactive tracers which have been made so far are just the beginning of what is going to become an extremely large and successful field of research."

(Copyright, 1946, Science Service)

Elemental Detective

Since 1869, when the Russian scientist Dmitri Mendeléeff first charted positions for 92 chemical elements,* the spaces for elements 43 and 61 have been blank. Theoretically, their existence has long been recognized. They have even been described tentatively by researchers, who named element 43 masurium after the Masurian Lakes in former East Prussia, and 61 illinium after the state of Illinois. But claims of their discovery were never wholly substantiated.

Now the missing blanks in the world's table of known elements have been filled—and through atom-bomb research. At an American Chemical Society symposium on nuclear chemistry in Atlantic City last week, Dr. Charles D. Coryell of the Monsanto Chemical Co. announced that he and a group of co-workers at Oak Ridge had positively identified for the first time elements 43 and 61 among the more than 150 new radioactive substances isolated during the splitting of uranium 235.

Element 43 has a half life (the time required for half the atoms of a radioactive substance to disintegrate) of 1,000,000 years, whereas the half life of element 61 is only four and a half years. Both elements will be renamed by the atomic authorities who discovered them.

Four other elements will also get official names. Nos. 85 and 87, created artificially by means of the University of California cyclotron and now known unofficially as alabamine and virginium after the states of Alabama and Virginia, are to be renamed. For Nos. 95 and 96, the two newest elements to be isolated, two formal names have already been proposed by their discoverer, Dr. Glenn T. Seaborg (NEWSWEEK, Nov. 26, 1945). Seaborg wants to call element 95 Americium, symbol Am, in honor of the Americas, and element 96, curium, symbol Cm, for Pierre and Marie Curie, who first isolated radium from pitchblende.

*Any substance which has not been decomposed into simpler substances by chemical action.

**SOUTHWEST
PRESS
CLIPPING
BUREAU**
KANSAS CITY, MO.
- OPEWA, KAN.

APR. 23, 1946 427
DES MOINES, IOWA, TRIBUNE

**"Atomic Literature"
To Date.**

For our modern "mass audiences" of press, radio, and movies, the capsule summaries of important documents and the accompanying pictures are often more important than the documents themselves.

Millions, for example, have seen the photos of the great mushroom-shaped puff of smoke which the atomic bomb raised above Hiroshima; while those who have read the Smyth report on "Atomic Energy for Military Purposes" could be measured in thousands.

In this case, the impact of the picture and a popular narrative gave our people a reasonably accurate impression of what had happened.

But the "capsule treatment" has dangers, too. The State department's hopeful report on "denaturing" atomic energy for civilian uses aroused such exaggerated expectations in some people that General Groves and various atomic scientists felt compelled to issue rebuttals.

* * *

Both the State department and the private National Committee on Atomic Information are anxious to get as wide distribution as possible of the full text of the State department report.

But the State department has always had very small appropriations for publicity. It first ordered 5,000 copies, then managed to get 100,000 more printed for schools, libraries, educational and political societies, etc.

The government printing office gets out an edition for sale to all comers at 20 cents apiece. The National Committee on Atomic Information thinks this is much too expensive. It would like to get it down to 5 or 6 cents apiece, so that organizations could order in bulk lots for their membership.

**Uranium Pictured
As Power Source
For Airliners**

Atlantic City, N. J. (Science Service)—Uranium 235 and plutonium will power future super-airliners, if (and a very big if) successful international controls prevent diversion of atomic energy sources for purposes of war, prophesied Dr. Glenn T. Seaborg of the University of Chicago, co-discoverer of plutonium and of the new elements americium and curium.

"Denaturing" atomic energy materials, he told the American Chemical Society, will not turn the trick alone. Dr. Seaborg emphatically warned. It can only slow down possible conversion for military uses, but cannot wholly prevent it.

For full control, to insure civilization's safety, only international agreements, firmly made and kept in good faith, will suffice. If this cannot be accomplished, it may be necessary to forbid completely all commercial applications of this revolutionary new energy source.

If the world can insure its own safety against misuse of atomic energy, revolutionary changes in industry such as the world has never seen are already at hand, the speaker declared. First will come application of atomic energy in large stationary plants, to generate electricity by driving turbine-connected generators. Then will come the propulsion of surface and submarine ships. Finally, after the atomic pile has been freed of the load of graphite now necessary for keeping the output of energy within safe bounds, the atomic-energy unit will sprout great wings and take to the upper air.

But none of these things can take place, without extreme peril to the whole world, until necessary international controls can be worked out.

The St. Louis Post-Dispatch considered the State department report important enough to print in full, in spite of its length. And now the National Committee on Atomic Energy is selling Post-Dispatch supplements for \$5 a hundred, including postage.

* * *

Meanwhile, the original Smyth report is a best seller, in spite of its weighty content.

The government, after sitting on the whole secret for five years, took the unusual step of allowing a private publisher (in this case the Princeton University Press) to put out copies. But it still sells at \$1.25, even in a paper binding.

The official American-Canadian-British and United Nations declarations about atomic energy were short enough so that many newspapers carried them in full.

Atomic research since 1940 was reported by a number of American scientists at the meetings of the American Physical society and the American Chemical society this year. These papers are too long and technical for general circulation, but we have an idea they will have a much broader circulation than scientific papers generally have—they had much bigger audiences than usual at their reading.

* * *

This handful of reports and papers make up just about the entire documentation of the new atomic age, so far.

It isn't much IN BULK to master; but it is still a question whether enough of us will master the IMPLICATIONS of it in time.

THE ORIGINAL
ROMEIKE
PRESS CLIPPINGS

220 W. 19th St., NEW YORK 11, N.Y.
Tel. CHelsea 3-8860

Cir. (D 60,108)

This Clipping From
NORFOLK VA.
LEDGER DISPATCH

APR. 23, 1946

00104

CHEMICAL AND ENGINEERING NEWS

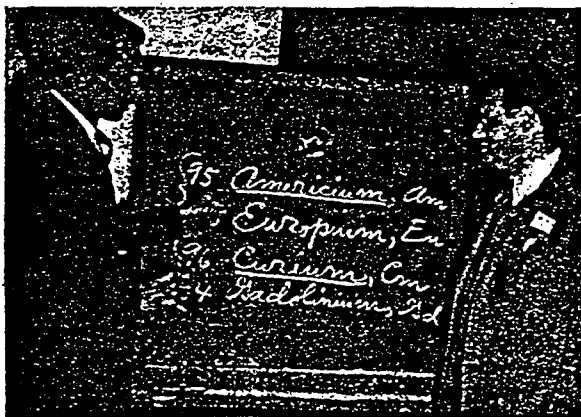
Nuclear Chemistry

An overflow crowd exceeding 1,000 attended the Nuclear Chemistry Symposium in which chemical discoveries associated with atomic energy researches were described. G. T. Seaborg, who presided, opened the symposium with some introductory remarks about the "denaturant" method of safeguarding against the misapplication of peacetime atomic energy units in atomic bombs. According to Seaborg, the denaturant is an alloy isotope that renders the material insensitive to fast neutrons (which activate an atomic bomb) while still permitting ample energy

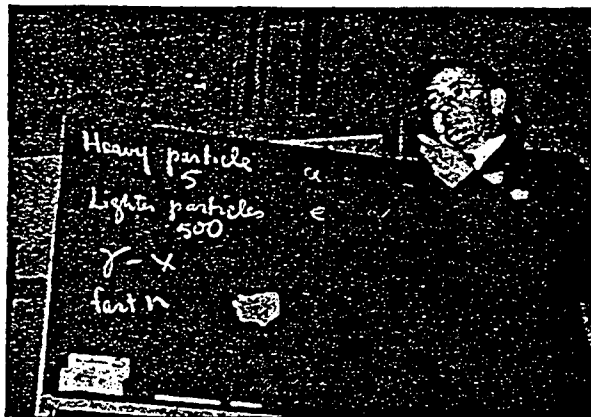


W. F. Libby presenting paper on the atoms produced by nuclear processes

Glenn T. Seaborg, who presided at the symposium on nuclear chemistry, and Charles D. Coryell, one of the speakers,



discuss the names of two new elements. Right. Milton Burton, who discussed radiation chemistry in the symposium





Leopold Ruzicka, noted Swiss chemist, discussing triterpenes before the Organic Division

output for peacetime power purposes. A plant of the type of Oak Ridge is necessary to separate the denaturant, and any nation intending to make the separation would give notice of its intentions automatically during the estimated minimum of one year that would be required to build such a plant under even the most favorable circumstances. Dr. Seaborg recommended adoption of the State Department Lilienthal Committee's proposal for an "Atomic Development Authority" to provide international control of atomic energy.

W. F. Libby described fundamentals of inducing radioactivity by particle bombardment, and some of the techniques of studying the high-energy level products. The applications and limitations of crystallization as a means of purification in these studies also were discussed. Milton Burton and C. D. Coryell described new fundamental radiochemical information obtained through use of new tools recently made available for radiochemical studies. Over 70 radioactive isotopes, from selenium through cerium, are known, and the radioactivity of the fission products of the plutonium pile is equivalent to that of tons of radium.

Dr. Seaborg briefly reviewed the history of the chemical studies of the transuranium elements, from the earliest "tracer" investigations based on radioactivity measurements to the historic ultramicrochemical methods, involving micrograms of material and accurate volumetric measurements of the order of 10^{-4} ml. Techniques and apparatus for this work were described.

It was announced that Seaborg and co-workers, discoverers of elements 95 and 96, have proposed for them the names "americium", Am, and "curium", Cm, respectively. A brief discussion of various terms for describing the important field of nuclear chemistry revealed that no term proposed ("radiochemistry" and "radiation chemistry" were mentioned in particular) is entirely free of objection,



H. E. Silcox presenting "Mass Transfer in Cyclone Spray Towers"

and no general preference was indicated in the comments.

In the discussion during the symposium it was explained that elements 43, 61, 85, and 87, formerly known as masurium, illinium, alabamine, and virginium and claimed to be stable elements, have been revealed in the course of this work to be radioactive and that their discoverers will have the privilege of renaming them. Now known to be extremely rare or non-existent in nature, all four of these elements have been prepared by artificial means and studied by tracer techniques.

Fundamental Organic Analysis

Leopold Ruzicka, internationally known Swiss chemist, addressed a capacity crowd of 600 in speaking to the Division of Organic Chemistry on the constitution of triterpenes. Structures were postulated for these organic compounds, and chemical tests were offered as support for the arrangements suggested.

Erwin Brand, left, secretary of the Division of Biological Chemistry, and David E. Green, winner of the first Paul-Lewis Laboratories Award in Enzyme Chemistry



E. T. McBee speaking on "The Production of Hexachlorobutadiene"

Enzyme Award Lecture

The first Paul-Lewis Laboratories award in enzyme chemistry, consisting of \$1,000 and a bronze medal, was made to David E. Green, of Columbia University. Dr. Green's award lecture, presented before the Division of Biological Chemistry, was on the subject "Keto Acid Oxidases on Animal Tissues". Structure of the enzymes was given and chemical reactions under various conditions were described.

Industrial and Engineering Chemistry

A variety of subjects was discussed at the general program of the Division of Industrial and Engineering Chemistry. The first paper reviewed a program of studies on wood, principally directed toward utilization of lignin compounds as a fertilizer or as food yeast nutrient. Other papers included studies of mass transfer in cyclone spray towers, the azeotropic purification of styrene, the production of hexachlorobutadiene, and lactic acid recovery from dilute solutions.

This Clipping From
ELLENSBURG, WASH.
RECORD

APR 26 1946

Through the expansion and application of man's knowledge of atomic energy the chemists, who have already transformed the world man lives in, will accomplish new miracles for the benefit of mankind. They will be able to give basic elements properties they never before possessed and thus create new materials with strange and wonderful qualities.

That much is clear to the layman, though he cannot hope to understand the processes by which this further progress will be brought about, from the reports of the symposium on nuclear chemistry that took place the other day at the meeting of the American Chemical Society at Atlantic City. Conducted by Prof. Glenn T. Seaborg of the University of California, co-discoverer of plutonium, the symposium was a startling revelation of how far chemistry has already gone along this new road.

For example, it is now known that radiations released by atomic fission can change the properties of familiar solids. By exposing graphite to these radiations its electrical resistance, elasticity and thermal conductivity can be altered. What results in a new substance that will be useful for purposes not served by the original element. As more than 150 radioactive substances previously unknown have been isolated as fission fragments of uranium 235, it is plain that science already has a host of new materials with which to work—and will have more.

The fact that four elements already named will be given new names as a result of the advances made in the study of nuclear energy helps to emphasize the importance of the strides made during the war period. Chemistry is acquiring not only more but better knowledge and the results will certainly be a tremendous surge forward in the years to come.

LISTEN: APRIL 20, 1946

In Nashville, during the last clothing drive, station WLAC sent 50 radio-equipped cars out to pick up bundles. They came back with 60 tons from 15,000 citizens.

In Philadelphia, station WCAU found the city's water system bad, went on the air steadily and forcefully and aroused enough citizens to do something about it.

In Utica, station WIBX went into the schoolrooms of the Mohawk Valley and showed teachers, students and parents how to work together to their mutual interest.

In Denver and Kansas City respectively, stations KLZ and KMBC demonstrated conclusively the rich benefits accruable to a community from a public-minded radio station.

All five stations are members of the CBS network. All five recently won *Variety's* prized major awards for "showmanagement". No other network can make this statement.

★

Q. What have the following songs in common?

- Carolina Moon*
- Stardust*
- When the Moon Comes Over the Mountain*
- It Was So Beautiful*
- These Foolish Things*
- God Bless America*
- Woodpecker Song*
- The Last Time I Saw Paris*
- Rose O' Day*
- Don't Fence Me In*

A. A great voice belonging to a great American launched them on the air, imparted its magic, and sent them echoing down the years. May 1st marks Kate Smith's 15th year on CBS; May 3rd her 3,170th broadcast.



Scientists like to assign the names of planets to the chemical elements they discover. They got to No. 94, or plutonium (used in atom bombs), and then ran out of planets. So when Dr. Glenn T. Seaborg of the University of California, a co-discoverer of plutonium, went on to help isolate elements 95 and 96 and add them to the periodic table, he was stumped for names. Four months ago on Columbia's *Adventures in Science* (Saturdays at 2:15 p.m. EST) he asked for help. Then he went home and thought of *americium*, as in America, for No. 95.

Last Saturday you may have heard

Watson Davis, director of the science program, announce the name Seaborg chose for No. 96. It is *curium*, as in Pierre and Marie Curie, and was one of 104 submitted by listeners from all parts of the country. It came from Irwin Almenoff and Anthony Saletan of Brooklyn and Manhattan, each of whom thought of it independently.

Additional suggestions on file are *clernium*, *paxium* and *unoium*—just in case the astronomers get caught with their telescopes down.

★

A girl from the midwest who served as a WAC in England and a British war bride were among the listeners who heard the *Columbia Workshop's* moving and nostalgic drama *Thanks for the Memories*. Written by a cavalry lieutenant, the play offered a poetic tribute to the hospitality and friendship he had found while serving overseas.

Both listeners sent us a letter. "I relived every moment," wrote the WAC. "An occasional tear fell," wrote the war bride. Thus radio once more demonstrated its unique power to reach into the hearts of people of widely differing backgrounds and emotions, to strike a common chord.

★

In New York a CBS broadcast by UNRRA's new director general appealed for food for Europe. A few minutes after the broadcast an Ossining listener wired her intention to buy a monthly grocery order for one family "until the end of starvation."

Across the continent, the Columbia Pacific Network told its listeners that the Dutch were running out of shoes. The audience sent in 7,647 pairs, none of them wooden.

One of the most common characteristics of a radio wave is its ability to generate a fellow-wave of generosity of tidal proportions.

This is

CBS

the COLUMBIA
BROADCASTING SYSTEM



Persephonium & Her Bastardium

Chemists of the Manhattan Project were having mythology trouble. They had created two new elements, Nos. 95 and 96 (TIME, Nov. 26). But when they tried to name them, they were stumped. Uranium (No. 92), neptunium (No. 93), plutonium (No. 94) had been named after



Culver

PLUTO & PERSEPHONE

Why not a by-blow?

the last three outer planets, Uranus, Neptune and Pluto.

For a while chemists called the new elements "pandemonium" and "delirium." Then one of them took a dive into Greek mythology and discovered that Pluto, god of Hades, had a goddess-friend, Persephone. Element 95, he suggested, should be named "persephonium."

But what about Element 96? Had the ruler of Hades no chick nor child? Pluto had kidnapped Persephone, and since Greek gods usually kidnapped because their hearts were in it, and goddesses were seldom barren, there might well have been a by-blow. Element 96, he reasoned, might be called "bastardium."

At this point, serious minds took charge again. Last fortnight, at the convention of the American Chemical Society in Atlantic City, Chemist Glenn T. Seaborg, chief human begetter of the two elements, officially named Element 95 "americium" (after the two Americas) and Element 96 "curium" (after the two Curies).

TIME, APRIL 29, 1946

Notes and Comment

Secretary Byrnes frankly says he is "standing in the need of prayer." So are other statesmen, but most of them won't admit it.

Once unionized, the toilers of the big league baseball would need a heart-touching grievance — like failure to receive time and a half for over 40 hours a month. — Hartford Courant.

"It says here," remarked the tenant who must vacate by the first, "that one-third of the nation is still ill-housed, the lucky stiffs." — Hartford Courant.

Shortages of certain goods are explained by the statement that "production is spotty." In other words, and at various points it has been shot full of holes. — Kansas City Star.

We know these days what old-fashioned philosophers meant when they said there are some things money won't buy. — Plain Dealer.

Scientists have discussed before the American Chemical Society the problem of weighing invisible material on invisible scales. Perhaps the butter salesmen could help them out. — Boston Traveler.

THE ORIGINAL **ROMEIKE** PRESS CLIPPINGS

220 W. 19th St. NEW YORK 11, N.Y.
Tel. CHelsea 3-8860

Cv. (D 8,344)

This Clipping From
TORRINGTON, CONN.
REGISTER

MAY 3 - 1946

5/5/46
Many Uses Foreseen for Tracers

More than 400 known radioactive materials have been discovered or prepared. Many are available for "atom-tagging" experiments in chemistry, physics, medicine and industry. Of these substances, the most important is Carbon 14, an isotope or variant form with the same chemical properties as ordinary carbon but with a greater atomic weight. Mankind may be able to synthesize food and fuel at will with the aid of this Carbon 14, a radioactive substance developed through atomic research, Dr. Glenn T. Seaborg, co-discoverer of plutonium, recently told the Physical Chemistry Division of the American Chemical Society's Pittsburgh Section.

"What happens in photosynthesis, the process by which carbohydrates are formed in the chlorophyll-containing tissues of plants exposed to light, is among the mysteries that may be cleared up by tagging atoms with Carbon 14 and observing their courses," according to Dr. Seaborg.

Light on Metabolism

Besides Carbon 14, which is radioactive, there is also Carbon 13, which is not radioactive. Dr. Seaborg says that the two isotopes complement each other. It is now possible to tag each of two different carbon atoms in a molecule or system and then simultaneously to observe the course of each. Dr. Seaborg predicts that with the aid of carbons 13 and 14 we shall find out what happens to protein, fats and carbohydrates when we consume them at a meal. The process (metabolism) is still a mystery. More light will also be shed on the action of vitamins, hormones and enzymes.

Among the other isotopes with great potentialities, Dr. Seaborg cites radioactive Hydrogen 3, which under certain

conditions can be used in many of the ways indicated for Carbon 14. Such isotopes at phosphorus 32, sulphur 35 and iodine 131 will also have their research uses.

Of special importance is the possibility held out by radioactive isotopes for studying the action of antibiotic substances, such as penicillin, streptomycin and the sulfa drugs. Dr. Seaborg points out that the synthesis of radioactive penicillin would be a boon. Physicians would know exactly what happens when it is injected or swallowed.

In Studying Cancer

Tracers will also have their uses in the study of cancer. "Here, there is the therapeutic possibility of effecting the selective deposition of the radioactive material in the cancerous tissue," says Dr. Seaborg. Ultimately it should be possible to synthesize some compound containing a radioactive substance, and lodge it in cancerous tissue where it can do its work without injuring healthy tissue.

Another possibility is that of tagging bacteria with radioactive carbon 14. Dr. Seaborg thinks this is feasible. In fact, a beginning has been made by tagging the tuberculosis bacillus with radioactive phosphorus in some experiments which have not yet been brought to completion.

Radioactive isotopes will also be used in industry. Dr. Seaborg believes it will be possible to use them to follow the course of products and impurities, to test the efficiency of distillation apparatus, or to discover leaks. Intense sources of gamma-rays will be used in radiography to find imperfections in metal products and to study the path of fast-moving parts.

W. K.

MILWAUKEE JOURNAL
Brewing Unit
57146
to Meet Here
Chemists Study Beer

Atoms, electronics and colors — things the layman might believe have nothing to do with the science



Dr. Seaborg

of making beer — will be topics of principal addresses this week at the first postwar convention of the American Society of Brewing Chemists. The conference, opening Sunday at the Pfister hotel, will continue through Thursday. Toly Agazim, director of research at the Pabst Brewing Co., is chairman of local arrangements. About 200 persons will attend.

Dr. Glenn T. Seaborg, 34, chemistry professor at the University of California, where in 1940 he was a co-discoverer of plutonium, will speak on "Atomic Energy" at a dinner meeting Tuesday night at the Pfister. Dr. Seaborg, a native of Ishpeming, Mich., has been a leading figure in investigation of nuclear chemistry and physics and, on leave from California, worked with the University of Chicago metallurgical laboratory in the development of procedures for manufacture of plutonium.

Science of Colors

Speaker at a luncheon meeting Monday will be J. C. Thompson, jr., Pittsburgh, assistant general paint manager of the Pittsburgh Plate Glass Co. Thompson, formerly in the Milwaukee office of the company, will give an illustrated talk, "The Science of Color." Glenn O. Paden, a member of the district engineering and service department of Westinghouse Electric Corp., will speak on "Electronics at Work" at a Tuesday luncheon session.

While the subjects seem unrelated to brewing, that is not the case, Agazim explained. Nuclear chemistry is important to the researcher in all phases of science, electronics is of interest because of its application to problems of sterilization, pasteurization and packaging in the brewing industry, and color science is of concern as it can be applied to working conditions and efficiency in the breweries, he pointed out.

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Technical committee reports and papers also will cover a wide range of subjects, and their content will have application to such varied industries as printing, baking, textile manufacture, metal working, distilling and farming, he said.

Brewers to Entertain

At social functions for the delegates, Pabst will be host at dinner Monday night, at which J. G. Shakman, Pabst vice-president, will speak; Jos. Schlitz Brewing Co. will entertain at a luncheon Wednesday noon, with Erwin C. Uihlein, president, to talk; and Blatz Brewing Co. has been scheduled to be host at a party for wives.

Final business sessions, including election of officers, will be held Wednesday, and Thursday will be a "visitation day," with the delegates scheduled to tour Milwaukee breweries, malting companies and manufacturing plants.

Officers of the society are: Bryn H. Nissen, Anheuser-Busch, Inc., St. Louis, president; Christian Rask, Albert Schwill Malting Co., Chicago, vice-president; Fred C. Baselt, American Can Co., New York, secretary, and Frank O. Rickers, Schaefer Brewing Co., New York, treasurer.



5/8/46

The ultramicro chemistry involved in producing sufficient plutonium to make the atomic bombs which destroyed two of Japan's cities and brought an end to World War II was sketched by one of the leading figures in the field of atomic energy Tuesday night at a dinner session of the American Society of Brewing Chemists' convention at the Pfister hotel.

The speaker was Dr. Glenn T. Seaborg, University of California nuclear researchist who is credited with co-discovery of plutonium and two recently discovered elements for which the names of americium (after America) and curium (after Pierre and Marie Curie) have been proposed.

While Dr. Seaborg's illustrated address largely was in the language of his fellow scientists, he made some comments which the layman could grasp. Production of atomic energy is limited to large structures today because of the immensity of the equipment required for its release, he emphasized, adding that atomic energy never could be applied to operation of automobiles because cars would not be feasible with the 50 tons of shielding which would be necessary to guard against radioactivity.

He was more optimistic about the possibilities of atomic energy for powering large ships, giant submarines and perhaps even huge aircraft, the use being dependent upon building such conveyances large

Possibilities of atomic power were discussed by Dr. Glenn T. Seaborg (right), University of California nuclear scientist, at the convention of the American Society of Brewing Chemists. He is shown with Bryn H. Nissen (left), president, and Toly Agazim, Milwaukee, of the convention committee. —Journal Staff

Atomic Power Can't Be Used to Run Cars, Scientist Says

enough to carry the atomic machinery.

There are two ways of releasing nuclear energy: The slow, controlled way, or through atomic explosion, he explained.

"Unfortunately," he commented, "the latter method works. Because it does, the world is struck with a problem of what to do about it." But he ventured that the slow, controlled way eventually would lead to atomic machines. Atomic machines could be used immediately in remote sites, he said, reiterating that shielding out radioactivity was the problem which placed limitations on their use.

In tracing the discovery of plutonium and the subsequent research at the huge government built secret plants to produce it in quantity, he

emphasized the minuteness of the material with which the scientists had to work, plus the necessity for speed. The demand for haste meant that simultaneously physicists had to solve the chain reaction factor and chemists had to determine how to separate plutonium from uranium so that plutonium could be used in a bomb, he said.

With election of officers and the windup of other business Wednesday afternoon, the society will conclude the official side of its convention. Many of the delegates, however, will remain over Thursday to participate in "visitation day," a day set aside for tours of Milwaukee brewing, malting and industrial plants. Included will be a dinner at the Froedtert Grain & Malting Co. plant.

OHIO AND TROJANS
ATOMIC EXPERT
RETURNS TO U.C.
TO HEAD RESEARCH

BERKELEY, May 29.—Dr. Glenn T. Seaborg, professor of chemistry and co-discoverer of plutonium, americium and curium, has returned to the University of California to direct research in atomic chemistry.

At Berkeley, Dr. Seaborg will be aided by a group of scientists who worked with him at the University of Chicago on development of a separation process for plutonium, used in the Nagasaki atomic bomb. They include Dr. I. Perlman, Dr. S. J. Thompson, L. O. Morgan, Albert Ghiorso and R. A. James. The chemists will collaborate with Prof. Ernest O. Lawrence, director of the Radiation Laboratory.

OHIO AND TROJANS
Atomic Bomb
Experts to
Work at U. C.

5/29/46

A group of outstanding nuclear physicists who played prominent roles in the development of the atomic bomb have been assigned to work at the University of California, it was announced today.

Heading the group, Prof. Wendell Latimer, dean of the college of chemistry, said, is Dr. Glenn T. Seaborg, one of the "brains" behind the atomic bomb. Doctor Seaborg will head new studies in atomic chemistry on the Berkeley campus.

A-BOMB DEVELOPERS

To work with Doctor Seaborg are Dr. I. Perlman and Dr. S. J. Thompson, who played prominent parts in the plutonium project; Dr. L. O. Morgan who, with Doctor Seaborg, is co-discoverer of element 95; Dr. Albert Ghiorso, who worked with Doctor Seaborg to discover the new element 96; and Dr. R. A. James, who also worked on the development of the two elements.

Doctor Seaborg's group will work in collaboration with other nuclear research headed by Dr. Ernest O. Lawrence, Nobel Prize winning inventor of the atom-smashing cyclotron.

WORKED AT U. C.

The group worked during the war at the University of Chicago developing a separation process for plutonium, the element used in the Nagasaki atomic bomb.

BERKELEY GAZETTE
5/29/46
Prof. Seaborg Named Head of
UC Atomic Research Program

Dr. Glenn T. Seaborg, a leading figure in atomic bomb research, has today returned to the University of California to take active charge, under the direction of Prof. Wendell Latimer, dean of the college of chemistry, of the University's research program in atomic chemistry.

Dr. Seaborg, who is professor of chemistry, has been on leave of absence since 1942 to the University of Chicago's Metallurgical Laboratory, where he was in charge of developing a separation process for plutonium, the element used in the Nagasaki atomic bomb.

Prof. Latimer said that a group of outstanding nuclear chemists has been gathered to work with Seaborg, including Dr. I. Perlman and Dr. S. J. Thompson, who played major roles in the plutonium project; L. O. Morgan, a codiscoverer with Dr. Seaborg of the new element 95, Americium; Albert Ghiorso, a codiscoverer with Dr. Seaborg of the new element 96, curium; and R. A. James, a codiscoverer of both these elements. All of these men collaborated with Dr. Seaborg at Chicago.

The chemistry group will work in collaboration with the scientific group under the direction of Prof. Ernest O. Lawrence, cyclotron inventor and director of the Radiation Laboratory.

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Circ. D. 14,444

JUN 5 - 1946

Chemists See Things

AMERICAN chemists have discovered, identified and investigated four substances that don't exist.

Dr. Glenn Seaborg, co-discoverer of plutonium and elements 95 and 96, explained this to the Pittsburgh section of the American Chemical Society: The substances were elements 64, 61, 85 and 87—"gaps" until now in the chemical table of discovered elements.

Earlier claims by chemists they had isolated these elements probably must be discounted now. They don't exist in nature. Seaborg's colleagues "created" them by smashing atoms of the elements' nearest weight-neighbors in the scale.

Such small amounts were created that they could not be examined chemically. But because they were artificially radio-activated they could be studied by their own radiation.

00115

Plutonium Expert Tells Peacetime Potentiality

Dr. Glenn T. Seaborg, 34-year-old codiscoverer of the plutonium which went into the atomic bomb, last night ventured into a realm of prophecy toward which most physicists have been extremely wary—the peacetime and commercial uses of atomic energy.

Himself a graduate of the Los Angeles campus of the University of California, and now physics professor of Berkeley, the young scientist listed the generation of heat, light and power for "isolated American communities," propulsion of seagoing vessels and supersized airplanes, and "tracer experiments" in medicine and industry as the prime future functions of the force obtained when the atomic power is unleashed for peace.

Dr. Seaborg made his forecast in the annual Morgan memorial lecture on the Westwood campus.

He warned:

"We can say definitely that atomic energy based upon the fission principle will never be a useful source of energy for the propulsion of ordinary automobiles."

Comic-Strip Dream Fades

In every consideration of atomic power, he explained, the size of the operating fission "factory" must be faced realistically. To get the desired chain-reaction that itself provides the energy, a mass of "fissionable isotopes"—such as uranium or plutonium—ranging from 600 pounds to 11 tons of natural element, must be used.

This would permit, Dr. Seaborg said, a "slow neutron chain," adequate for commercial purposes if a "moderator," further slackening the nuclear bombardment, were employed. Additionally, a shield of steel or concrete, many feet thick, must surround this "high energy pile" of uranium to protect its users from the deadly radioactive effects, he explained.

An atomic bomb is packed with an "explosive fast neutron reaction" uranium, Dr. Seaborg said, whose so-called critical mass is from four to 200 pounds of the pure fissionable element. But this, it was indicated, is a destructive, rather than constructive, force.

Large Bulk Necessary

"Under conditions where a large amount of bulk can be tolerated," he said, "huge station-

ary power plants, in which the energy is removed by water or air, might be used for space heating. Or the hot fluid or steam might be employed to operate a turbine which in turn can transfer its energy to an electric generator."

Areas isolated from hydroelectric power, or too far from coal-driven power plants to make distribution of energy economically feasible, Dr. Seaborg told his audience, thus can expect one day to derive much good from nuclear fission. On a cost basis, he said, uranium's tremendous power-per-pound puts this element on a reasonably competitive basis with bituminous coal or petroleum fuels.

"One pound of U-235 (uranium)," Dr. Seaborg declared, "is equivalent to 11,400,000 kilowatt hours of energy, which in turn equals 1500 tons of coal or 200,



Dr. Glenn T. Seaborg

000 gallons of gasoline. And we may place a price of \$1400 per pound on this element."

To compete with coal, he said, uranium could even cost \$9000 a pound.

Ships may one day use atomic energy, he added; and so may large submarines which, by this means, will develop astonishing cruising ranges. New improvements in shielding the "fissionable mass" against radiation, he concluded, may even permit atomic-driven aircraft—of very large size.

Berkeley Gazette Predicts Uses For Atom Energy

LOS ANGELES, June 6 (U.P.)—Ships and airplanes propelled by atomic energy were foreseen today by physicist Dr. Glenn T. Seaborg, co-discoverer of plutonium.

But, he said, atoms will never drive automobiles.

Seaborg, speaking at University of California at Los Angeles, said cost and size of usable units ruled out the use of atomic energy in vehicles.

A shield made up of many feet of steel or concrete would be necessary for protection from the powerful rays thrown off, he said.

"There is no reason," he said, "why it cannot eventually be adapted to seagoing vessels."

SAN FRANCISCO CHRONICLE 6/14/46

Army to Release Atom

Discoveries for Medical Use

By FRANK CAREY

Associated Press Science Reporter

OAK RIDGE, Ten., June 13—The Government opened the gate tonight to the use of atomic energy for benefitting man instead of killing him.

Radioactive substances produced in the uranium ovens where the atomic bomb was born will be distributed for the first time to schools, hospitals and laboratories of science and industry, the Army's Manhattan project announced.

The new program opens the way for the widespread use of substances which can be detected even though invisible and which therefore may:

1—Shed new light on the processes of human life, both normal and diseased;

2—Provide new information on animal and plant growth, and on the way the body uses food and medicine;

3—Help mankind further in making certain products and in tapping the resources of nature.

It also is possible, scientists said, that the substances may be used directly to treat disease.

The announcement indicated only institutions in this country will receive them. It said it probably will be impossible to meet even all of these demands until additional production facilities are built, and "this is not contemplated in the immediate future."

A radioactive substance is one which emits atomic particles, or rays. Radium is an example of one that occurs in nature. Substances

are made radioactive in the uranium ovens by being bombarded with atomic projectiles.

Although it is said present production of the substances is limited, the War Department declared there is a prospect of "large scale" availability and that application for small amounts could be made immediately by hospitals, universities and non-industrial research laboratories and by clinical investigating groups.

"The increased and general distribution," the announcement said, "may well have far-reaching importance in peacetime research in physics, chemistry, metallurgy and the medical sciences."

Relating a story of accomplishment rivaling the dreams of the ancient alchemists, the Manhattan

engineer district gave details on the production of approximately 100 different "radio-isotopes"—radio-active forms of common and rare elements produced in the uranium chain-reacting "atom pile" at Oak ridge.

It said that in the production of certain isotopes, the uranium ovens could "far outdistance" the output of a cyclotron—the so-called "atom smasher" instrument used even before the war for making minute quantities of radioactive substances.

For some things, like radioactive carbon—which is in great demand by researchers—the uranium pile can be made "equivalent in production to hundreds of cyclotrons," the announcement said.

The radio-isotopes will be used in two important ways, the announcement said:

"First, as tracer atoms or 'tracers' for following the course of atoms in chemical, biological and technical processes.

"And possibly second, after considerable research, as therapeutic agents for the treatment of certain special diseases."

U. C. Already Studying Uses For Radio-Active Isotopes

The University of California's College of Chemistry and Radiation laboratory already are doing research to improve use of the radio-active isotopes. Dr. Ernest Orlando Lawrence, Professor Glenn T. Seaborg and Professor Wendell Latimer, chemistry dean, are heading the U. C. work.

BERKELEY DAILY GAZETTE

BERKELEY, CALIFORNIA, FRIDAY EVENING, JUNE 14, 1946

Unleash Atoms for Medicine

Prof. Ernest O. Lawrence, director of the Radiation Laboratory at the University of California, today declared that a milestone in science is marked with the announcement by the Manhattan Engineering District that radioactive substances will be distributed nationally for use in research and for medical treatment.

Radioactive isotopes, or "sisters" of common elements, which can be produced both at the Hanford, Wash., and Oak Ridge, Tenn., atomic bomb plants, will be useful in almost every branch of physical and biological science, he said.

The Manhattan District's announcement appearing today in "Science" said also that the electro-magnetic separation process for U-235, developed at the University's Radiation Laboratory and applied to the production of atomic bombs at Oak Ridge, Tenn., will be used for the peacetime development of other pure isotopes of common elements.

With the assistance of the Manhattan Project, the University of California's College of Chemistry and the Radiation Laboratory have already undertaken research to improve and perfect the radioactive tools of research. A major role in this effort is being played by a brilliant group of young nuclear chemists, headed by Prof. Glenn T. Seaborg, of the leading atomic bomb researchers, under the direction of Prof. Wendell Latimer, dean of the College of Chemistry.

RESEARCH TOOLS

In the development of new atom-smashing machines now under construction—the 184-inch cyclotron and the synchrotron—both of which will be capable of accelerating atomic projectiles to hundreds of millions of electron volts, will prove invaluable, it is stated.

In its distribution of radioactive materials to laboratories and medical centers the Manhattan District will be able to do on a larger scale what the University of California did on a small but significant scale before the war.

With its 37 inch and 60 inch cyclotrons the University was the first producer of radioactive isotopes on a scale large enough to sustain widespread and varied scientific investigations.

While most of the materials produced in the cyclotrons were used in research by many departments of the University, 30 per cent was sent to medical centers and research laboratories all over the nation and to Hawaii, Belgium, Denmark Italy, Australia, Argentina and Peru.

"PILE TECHNIQUE"

Cyclotrons cannot supply the widespread demand for radioactive isotopes, but for many of these materials the "pile technique" developed in atomic bomb research will prove an adequate source. The "piles," which were constructed to produce plutonium, are a rich source—much richer than cyclotrons—of neutrons, the atomic particles which transform ordinary elements into radioactive substances. Therefore, for radioisotopes transmuted by neutrons, which includes most of the known ones, the "piles" will make available a considerable supply.

The radioactive materials will be distributed under the direction of the National Distribution Committee of the Policy Committee, established as advisory to General Leslie R. Groves, Army director of the Manhattan District.

TREAT DISEASE

Research with radioactive materials has already shown some promise in the treatment of some diseases, and the beginnings have been made in the development of a vast wealth of heretofore unobtainable information in chemistry, biology, agriculture and other sciences.

In the treatment of disease the radioactive materials are promising because of their radiations, which have similar effects on tissue as X-rays and radium.

In biological and other research with living systems the isotopes are valuable because they can be traced through the system by means of the radiations they emit.

In chemistry they are valuable as "tracers" in learning more about chemical reactions and atomic structure.

'A' Science Advances Predicted

Epoch-making advances and discoveries in atomic research are in store for science in the near future, Prof. Glenn T. Seaborg, co-discoverer of plutonium and a leader in atomic bomb research, said in a talk at Gibson Island, Md., tonight. Professor Seaborg's speech, presented at a conference of the American Society for the Advancement of Science, was released here simultaneously with its presentation in Maryland.

Prof. Seaborg pointed out that there are now known publicly more than 400 artificial radioactive isotopes, or "sisters" of ordinary elements, which can be used for tracer or "atom tagging" experiments in the fields of chemistry, physics, biochemistry and medicine. There is at least one radioactive form of every element from 1 to 96.

"The work in connection with the plutonium project of the atomic bomb development has resulted in the production, or possibility of production, of a considerable number of additional radioactive isotopes, many of which are still in the secret category," Prof. Seaborg said.

DISCOVERIES SEEN

"More important than this, however, is the fact that this development has given rise to vastly superior methods for the production of a number of these isotopes and in particular a number of the most important ones. It seems realistic and entirely safe to predict that a large number of advances and discoveries will be made in the future, a few of them epoch-making.

"It is not at all out of the question that the greatest gains to humanity from the atomic energy development will result from the widespread use of tracers to solve a multitude of problems rather than from the harnessing of the power itself."



Dr. Glenn Seaborg toys with plutonium.

PCC
DR. GLENN T. SEABORG

As late as 1942 some of our most outstanding scientists believed it would take five years before a process could be developed separating the atomic bomb substance, plutonium, from uranium. At about this time, however, tall, gaunt Dr. Glenn T. Seaborg, professor of chemistry at the University of California, took a leave of absence from Berkeley to study the chemistry of plutonium at the Metallurgical Laboratory of the University of Chicago. Assisted by U. of Cal. associates, who had been co-workers in nuclear chemistry, Dr. Seaborg led the project so successfully that the process was designed and, as everyone knows, made possible the production of atomic bombs in about three years. And, at 33, Dr. Seaborg was named the outstanding young man of Chicago for 1945 by the Chicago Junior Association of Commerce.

Co-discoverer of the atomic bomb substance, plutonium, and of elements 95 and 96 (trans-uranic substances still unnamed), Dr. Seaborg hails from Ishpeming, Mich. He moved to South Gate, Cal., when he was 10 where he went to high school, then got on the night shift with Firestone Rubber as a laboratory assistant. He saved enough money to enter the University of California at Los Angeles (UCLA) and romped through his chemistry major with Phi Beta Kappa grades. Three years later, in 1937, he got his Ph.D. at the University of California (Berkeley), writing his thesis on the inelastic scattering of fast neutrons, no less.

In 1939 he became a chemistry instructor in the U. of Cal., rose to an assistant prof, was upped to a full professorship because of his great work on the atomic bomb.

Long and slender, like one of his test tubes, Dr. Seaborg gets out on the golf course two or three times a week when possible. He usually plays with fellow scientists, as his associates like his company both in and out of the laboratory.

Dr. Seaborg's prediction that the chemical process of separating plutonium from uranium would be underway within six months after plutonium was produced in quantity caused Dr. James Conant, celebrated Harvard prexy, to remark, "He's a good man but I doubt if he's that good." Some rubble at Nagasaki answered this one.

JUNE, 1946

HIGH HONOR DUE U. C. CHEMIST

S. F. EXAMINER 8/11/46
Associates Predict Nobel Prize
For Atomist Seaborg

The next Nobel prize to be awarded for achievements in chemistry probably will be given to the University of California's Dr. Glenn T. Seaborg, fellow professors at the university were predicting yesterday.

University scientists describe the 34-year-old Doctor Seaborg as "one of the world's leading chemists" and a "leader in nuclear chemistry."

AIDED HANFORD.

During the war, Doctor Seaborg headed a group of scientists at the University of Chicago metallurgical laboratory, devising a method of chemical separation of plutonium from uranium, a process now used at the atomic piles at Hanford, Wash. Material for the Nagasaki bomb was produced in this manner.

He also is a co-discoverer of the trans-uranic elements 95 and 96, and has identified a large number of the radioisotopes now known to nuclear physicists and chemists.

SWEDISH DESCENT.

He was born in Ishpeming, Mich., of Swedish ancestry, and received all his degrees from the University of California.

The last Nobel award in chemistry to an American was to Dr. Harold C. Urey in 1934, and the last awarded to an American physicist was to Dr. Ernest O. Lawrence of the University of California, inventor of the cyclotron, in 1939.

Power of Atom May Be Useful

An atomic energy power plant can become an accomplished fact as soon as organized effort is put in this direction, says Dr. Glenn T. Seaborg, professor of chemistry at the University of California and one of the research leaders on the atomic bomb development.

Dr. Seaborg says that the type of atomic power plant which could be built now would be limited in usefulness and could be built only as a large, stationary power source. He added, however, that the future may increase the versatility of potential atomic power plants.

ISOLATED SITE

Since it cannot presently compete economically with other kinds of energy, such an atomic power plant would be most useful in a site which is isolated from ordinary sources of energy such as coal or electricity. For example, Lower California, which has a good climate, might be a good place for an atomic power plant.

Here it is expensive to use coal, which must be shipped, and there are no electrical power sources. While the initial cost of an atomic power plant there would be high, its operation over a period of years would make it economically practical.

SPACE HEATING

"Such large stationary power plants in which the energy is removed by water or air might be used for space heating in which the hot water or steam or hot air is conducted from the central power plant to the various locations where the heating is desired," Dr. Seaborg said. "Or the heat energy in the form of a hot fluid might be used wherever heat is necessary in some industrial process.

"The hot fluid or steam might be used to operate a turbine which in turn can transfer its energy to a form which is generally useful for electrical and mechanical power."

SAN FRANCISCO CHRONICLE
8/19/46

Atom-Heated Homes Are Predicted

Homes economically heated by hot water, steam or hot air from nearby atomic energy power plants were visualized yesterday by Dr. Glenn T. Seaborg, professor of chemistry at the University of California.

Dr. Seaborg, one of the research leaders on the A-bomb developments, says that while the type of atomic power plant which could be built now would be limited in usefulness, the future may increase the versatility of such plants.

Since it could not compete economically with other kinds of energy, such a plant would be most useful, says Dr. Seaborg, in a site which is isolated from ordinary sources of energy such as coal or electricity from water reserves. Lower California was cited as an example.

"Large stationary atomic power plants in which the energy is removed by water or air might be used for space heating in which the hot water or steam or hot air is conducted from the central plant to various locations where heating is desired," Dr. Seaborg reported.

SOUTH GATE FISSION EXPERT SAYS 'ATOM ENGINE' POSSIBLE

● AN ATOMIC energy power plant can become an accomplished fact as soon as organized effort is put in this direction, says Dr. Glen T. Seaborg, professor of chemistry at the University of California and one of the reearch leaders on the atomic bomb development. Dr. Seaborg's parents are South Gate residents.

Dr. Seaborg says that the type of atomic power plant which could be built now would be limited in usefulness and could be built only as a large, stationary power source. He added, however, that the future may increase the versatility of potential atomic power plants.

Since it cannot presently compete economically with other kinds of energy, such an atomic power plant would be most useful in a site which is isolated from ordinary sources of energy such as coal or electricity from water reserves. For example, Lower California, which has a good climate, might be a good place for an atomic power plant. Here it is expensive to use coal, which must be shipped, and there are now electric power sources. While the initial cost of an atomic power plant there would be high, its operation over a period of years would make it economically practical.

"Such large stationary power plants in which the energy is removed by water or air might be used for space heating in which the hot water or steam or hot air is conducted from the central power plant to the various locations where the heating is desired, Dr. Seaborg said. "Or the heat energy in the form of a hot fluid might be used wherever heat is necessary in some industrial process. The hot fluid or steam might be used to operate a turbine which in turn can transfer its energy to

an electric generator thus converting the energy to a form which is generally useful for electrical and mechanical power."

BERKELEY DAILY GAZETTE

16 PAGES

BERKELEY, CALIFORNIA, TUESDAY EVENING, SEPTEMBER 24, 1946

Entered as Second Class Matter at the Postoffice at Berkeley, Calif., on April 27, 1932 under the Act of March 3, 1879

Solar Energy Control Seen By UC Man

By PAUL F. ELLIS

United Press Science Writer

PRINCETON, N. J., Sept. 24.—

A scientist, who had much to do toward developing the atomic bomb, said today that the time may come when man will not need the sun to make his garden grow.

This scientist, tall, lanky Glenn Seaborg, University of California physicist, told a conference on the future of nuclear science that man's ability to synthesize food, and also fuel, was not out of the question.

"This could rise," he said, "to a literal harnessing of the sun's energy."

To do this trick, scientists will have to do further research with radioactive Isotopau, the by-product of the uranium chain-reacting piles in the atomic bomb factories.

He told of experiments with radioactive carbon on certain types of plant life under various controlled conditions in the light as well as in the dark.

"The results obtained so far have been rather surprising," he said.

"SCRATCHED SURFACE"

Seaborg said that science using the radioactive elements had merely scratched the surface and that "it seems realistic and entirely safe to predict that a large number of advances and discoveries will be made in the future, a few of them epoch-making."

It is not at all out of the question that the greatest gains to humanity from the atomic energy development will result from the widespread use of tracers to solve a multitude of problems rather than from the harnessing of the power itself, he said.

Seaborg said that radioactive elements, such as carbon and phosphorous and radioactive iodine, already were being used in medicine, particularly in the treatment of cancer and overactive thyroid glands.

00124

SCIENTIFIC LEADERS AT PRINCETON



Associated Press Wirephoto.

Irene Curie-Joliot of the College of France chatting at the university's bicentennial conference yesterday with H. J. Bhabhn of the Tota Institute, Bombay, India (left) and Neils Bohr of the University of Copenhagen, Denmark.

Scientists Hail New Approach To Study of Nuclear Physics

By MONTGOMERY WRIGHT.

Intense interest was aroused today among scientists attending the conference at Princeton University on the future of nuclear science by a paper delivered by Dr. P. A. M. Dirac of Cambridge University which offers a new avenue of approach to the investigation of nuclear physics.

Dirac, Lucasian professor of mathematics at the English university, offered for the first time publicly a mathematical solution of a puzzle in classical dynamic theory which long has

bothered scientists. His paper on elementary particles and their interaction was hailed by conferees at the Princeton bicentennial as unquestionably one of the most important of recent years. It made obsolete at least two of

the papers delivered as recently as last week at the meeting of the American Physical Society in New York. The intricately technical explanations by Dirac, which fascinated the approximately seventy-five scientists at the meeting here, can have for the non-scholar only the romantic interest attached to a dimly glimpsed mystery touching a subject of first importance, the romance of the Einstein theory of relativity, for example.

Stated in the briefest and least technical words which can suggest Dirac's central idea, he has given up the theory of the electromagnetic origin of mass and introduced the concept of an electromagnetic field without energy. The theory is the first one on this special problem which did

not run into a paradoxical denial of itself when it was worked out.

Interest in Dirac's statement is heightened by the fact that an earlier prediction made by this mathematician, who was a Nobel prize winner in physics in 1933, was followed by discovery of the positron. A positron, by the way, can be defined as a hole in space, which gives an idea of the difficulty of expressing these concepts in terms of everyday language and thinking.

Dirac declines to discuss the possible meanings of his theory. But scientists who are close to him and have studied his paper emphasize that it "does not mean bigger and better atom bombs right away." No practical application of the theory can be discerned at present, these scientists say, but the big advance is in the new avenue of approach now opened.

Prof. Glenn T. Seaborg, chemist of the metallurgical laboratory of the University of Chicago, talked at this afternoon's session on the application of artificial radioactive tracers to chemistry and medicine. He reiterated the statement made recently by other leading scientists that it was not out of the question that the greatest gains to humanity from atomic energy development would come from this rather than from the harnessing of the power itself.

Dr. Albert Einstein of the Institute for Advanced Study at Princeton was quoted today by a Princeton University professor who had talked to him about the Dirac paper as saying that "it started a new direction of thought."

At last night's session of the meetings, which are being held in the Graduate College of Princeton University, Dr. Harlow Shapley, astronomer, director of the Harvard College Observatory, urged upon his audience the gains which could be attained through the United Nations Educational, Scientific and Cultural Organization (UNESCO). He was a delegate from our State Department to the London conference, where UNESCO's charter was written, and is adviser to the State Department on UNESCO's work in science.

"I propose serious consideration by UNESCO," Shapley said, "of creating an international observatory, an international institute for the study of the gaseous envelope, a central institution

with substations for the international exploitation of food plants, an international institution for the study of health and nutrition, an international marine biological station, perhaps located at Naples—"

Shapley paused, smiled ironically, and continued: "Eventually, an international center for the study, with great atom smashing and transforming apparatus, of the nucleus of the atom."

New Atom Theory Is Developed

9/24/46

Special to The Inquirer

PRINCETON, N. J., Sept. 24.—A new conception of the nature of matter, which eventually may help scientists to release from common elements, such as hydrogen, even greater amounts of atomic energy than are now obtained from uranium or plutonium, was presented here today by Dr. P. A. M. Dirac, professor of mathematics at Cambridge University, England.

Dr. Dirac, Nobel Prize winner in physics in 1933, outlined his theory before more than 100 internationally known scientists at the second day of a three-day conference on the future of nuclear science. The conference is the first of 15 on various scholarly subjects to be held as part of Princeton University's bicentennial celebration.

BASIC MATTER 'MERE POINTS'

Dr. Dirac's theory drew praise and applause from the conferees, since it threw light on a problem which has baffled research experts for more than 40 years.

The noted British mathematician stated in a highly technical paper that through mathematical equations he had found that the three primary particles from which all matter is formed—namely, electrons, protons and neutrons—are "mere points, without size," consisting of an electrical charge and mass only.

(Scientists have believed the particles consist of an electrical charge, an electric field, energy and mass.)

'NEW DIRECTION' STARTED

If the particles have no mass but size—an idea incomprehensible to the layman—they can approach one another so closely that their normally weak attraction becomes immensely strong, one of the other conferees explained to reporters. Thus, he said, if a piano wire could be made of atomic nuclei, a single strand possibly could support the weight of the entire pre-war U. S. Navy.

Dr. Albert Einstein, one of those present at the meeting, said that Dr. Dirac's theory "has started a new direction of scientific thought."

Another speaker, Dr. Glenn T. Seaborg, of the metallurgical laboratories of the University of Chicago, who helped develop the atomic bomb, explained the uses of new man-made atoms, of which about 450 have been produced thus far.

N.Y. TIMES
SEPT. 26 1946
**New 10-Billion Volt Atom Smasher
Is Planned by California Scientists**

**It Will Make Existing Ones Look Like Toys
and Cost \$60,000,000, Bicentennial
Gathering at Princeton Hears**

By WILLIAM L. LAURENCE

Special to THE NEW YORK TIMES.

PRINCETON, N. J., Sept. 24—
Scientists of the University of California, birthplace of the cyclotron, the synchrotron and the linear accelerator for protons, gigantic atom-smashing devices, are already considering the construction of an atom-smasher that could generate atomic particles of the unheard of energies of ten billion volts.

The possibilities of such apparatus that would make all the present similar devices, including the giants still in the process of construction, mere toys by comparison, were outlined here today at the bicentennial conference on the future of nuclear physics, celebrating Princeton's 200 years in the nation's service, by Prof. Ernest O. Lawrence of the University of California, winner of the Nobel Prize for his development of the cyclotron.

Cost Put at \$60,000,000

While immediate construction of this atomic goliath is not under consideration, the principal obstacle standing in the way is the great cost, Professor Lawrence intimated. Such machines, if built, would be beyond the reach of any private institution and therefore would have to be constructed with Government funds. Some of the scientists here estimated that the cost of such an apparatus might be in the vicinity of \$60,000,000.

Nevertheless, scientists are already drawing blueprints for such apparatus, to be ready for the time when the building of such giant machines becomes a vital necessity for the furtherance of our knowledge of the constitution of the atom and the physical universe. Many scientists believe that such a necessity already exists.

The machine, Professor Lawrence said, would require a circular magnet having a diameter of 160 feet. It would have enough energy to create cosmic rays at will, duplicating on earth processes that at present take place only in the vast reaches of space.

Scientists at Princeton University, headed by Prof. John A. Wheeler, also are considering the need for building multi-billion-volt apparatus. Prof. Marcel Schein, noted cosmic ray authority, of the University of Chicago, indicated the need for such apparatus when he complained that the present apparatus, still incomplete, could develop only "very weak" cosmic rays of a mere 100,000,000 volts.

Professor Lawrence reported on progress in the construction of new giant machines of smaller dimensions with which he and his associates will storm the citadel of the atom with atomic bullets catapulted with energies of 300,000,000 volts.

In reply to a question by Irene Curie Joliot, daughter of Mme. Curie and Nobel Prize winner with her husband, Frederic Joliot, Dr. Lawrence said he intended to employ as his atomic projectiles the cores of hydrogen, helium, beryllium and carbon atoms.

Another California scientist, Prof. Glenn T. Seaborg, co-discoverer of plutonium, Americium and curium (elements 94, 95 and 96, respectively), told the distinguished gathering that elements created artificially by atomic energy had brought man to the threshold of finding out many of the most important secrets of nature. With these, he declared, it might become possible to produce foods artificially in great abundance, to harness the energy of the sun for limitless power, and to solve the mysteries of disease.

One of the most promising of these new elements, Professor Seaborg said, was a new type of carbon of atomic weight fourteen, two units heavier than ordinary carbon.

"There is a whole vista of opportunity opened up as the result of the availability of the carbon 14 isotope," Dr. Seaborg said. "Organic chemists, biochemists, physiologists, and the men of medicine, have dreamed for years of the day when a radioactive isotope of carbon suitable for tracer (tagged atom) investigations should become available. While a few of the

possibilities which have opened up through the availability of this isotope are already discernible, this field is so vast that it is certain that the best ideas are yet to come.

"It is in the field of biochemistry, both organic and physical, that the carbon isotopes will have their greatest usefulness.

"It is not out of the question that a complete understanding of the photosynthetic mechanism (the mechanism whereby plants create food and store up solar energy) might give man the ability to synthesize food and fuel at will, using this principle. This would give rise to a literal harnessing of the sun's energy.

Prospect in Biology

"Many biologists believe that artificial radioactivity has given biology and medicine what is probably the most useful tool for research since the discovery of the microscope, because almost all of the elements and compounds in biological systems can be tagged (with the radioactive atoms) and thus their course through living systems studied.

"The study of the mechanism of action of antibiotic substances (such as penicillin and streptomycin), many of which act by means not completely understood, will be possible.

"The mechanism of action of antibodies (immunity agents in the blood serum) might also be investigated by the use of radioactive tracers. Another possibility, which may sound quite startling, is the tagging of bacteria with radioactive carbon 14. In fact, a beginning has been made by tagging the bacillus of tuberculosis with radioactive phosphorus in some experiments which have not yet been brought to completion."

New Elements Named Americium, Curium

9/46

THE two newest chemical elements to be discovered, numbers 95 and 96, were recently christened "americium" and "curium" by their codiscoverer, Dr. Glenn T. Seaborg, of the Metallurgical Laboratory, University of Chicago.

Made synthetically from uranium and plutonium as a consequence of the atomic bomb research, americium and curium were manufactured in the University of California cyclotron at Berkeley by bombarding Uranium-238 and Plutonium-239 with 40,000,000 electron volt helium ions. Dr. Seaborg announced the discovery of these two elements last fall.

The chemical symbols of the new elements will be Am and Cm.

Element 95 is named after the Americas, or the New World, and element 96 is named after Pierre and Marie Curie, the great leaders in the study of radioactivity.

When neptunium, element 93, and plutonium, element 94, were discovered

Seaborg Discusses Atomic Experiments

By Jack Bik '49

"Our goal is to learn as much as we can about the nucleus of the atom," announced Glenn T. Seaborg, professor of chemistry, as he revealed the presence on the campus of a team of 20 chemists from the Metallurgical laboratory of the University of Chicago who are working on the newly discovered trans-uranium elements.

Seaborg, who participated in the discovery of plutonium in 1940, has recently returned to campus after an absence of four years, during which he was in charge of research which led to the identification of elements 95 and 96.

"It was exciting work trying to create the atom bomb in time," Seaborg reminisced. Seaborg left the University in April, 1942, to work on the Manhattan project as research director in charge of plutonium chemistry at the Metallurgical laboratory.

"We thought at that time that it was a race with Germany but it turned out afterward that they were far behind us when we finally

dropped the bomb. Apparently Hitler did not have much faith that an atom bomb could be devised."

Seaborg left the University for Chicago when it was decided that all chemists who had been working on the separations processes for obtaining pure plutonium could conduct their work at the Metallurgical laboratory. On leaving, he took with him Isador Perlman, now associate professor of chemistry, and Burris B. Cunningham, now assistant professor of chemistry at the University.

While Seaborg remained at Chicago to direct the work there, Perlman traveled on to the laboratories of the huge plutonium plants at Oak Ridge, Tenn., and to Hanford, Wash., where, according to Seaborg, his work "was of particular importance to the success of the process."

Meanwhile, Cunningham, in collaboration with L. B. Warner, graduate student in biochemistry here, prepared in August, 1942, the first pure sample of plutonium, free from carrier material and other foreign matter. This was the first time in

history that a weighable amount of an artificially produced element was isolated.

Finally, as a result of their experiments, the "chemistry of plutonium became as well understood as or better understood than is that of most of the elements in the periodic system," and the army was all ready to construct the second atomic bomb which proved so disastrous to Nagasaki.

Climaxing the work at the Metallurgical laboratory, Seaborg, in collaboration with R. A. James, L. O. Morgan and A. Ghlorso, produced elements 95 and 96, which, like plutonium, never existed in nature.

Deciding that these elements needed a name, these investigators decided to call element 95 "americium," after the Americas, and element 96 "curium," after Pierre and Marie Curie, who fifty years ago first started the experiments in radioactive elements which later reached their climax in the atom bomb.

BERKELEY DAILY GAZETTE

BERKELEY, CALIFORNIA, TUESDAY EVENING, OCTOBER 8, 1946

Fact Series On Atom Is UC Project

The "Facts About Atomic Energy" will be discussed by a leading group of University of California scientists in a series of class lectures to be presented through the facilities of the University of California Extension at the San Francisco center, 540 Powell St., beginning Friday, Oct. 11, from 8 to 9 p.m.

The six eminent scientists who will speak on varied aspects of atomic energy include Dr. Edwin MacMillan, one of the Nation's leading experimental physicists and one of the discoverers of plutonium, who will speak on the "Physical Background of Atomic Energy" at the first class meeting. "Chemical Aspects of Atomic Energy" will be explained the following Friday, Oct. 18, by Dr. Glenn Seabory, a leading authority on the chemistry of atomic energy, who is also one of the discoverers of plutonium, the atomic bomb substance.

Dr. Robert S. Stone, professor of radiology in the University of California Medical School, who was in charge of health activities at the Chicago, Oak Ridge and Hanford, Washington atomic research centers, will speak on "Atomic Energy in Medical Practice" on Oct. 25; and his colleague, Dr. Joseph Hamilton, also of the University's Medical School, will lecture on "Radioactive Tracers in Medical Research," the night of Nov. 1. Dr. Isadore Perlman, who worked with Dr. Seaborg at Oak Ridge, will speak Nov. 8 on "Radioactive Tracers in Medical Research."

DR. OPPENHEIMER

The lecture, Nov. 15 will be given by Dr. J. Robert Oppenheimer, professor of physics and former director of the University of California atomic bomb laboratory at Los Alamos, N. M. Dr. Oppenheimer acted as consulting scientist for the citizens' committee report upon which the Baruch proposal to the UN was based. He will speak on the challenging subject, "Atomic Energy as a Contemporary Problem."

Dr. George A. Pettitt, assistant to the president of the University, will be chairman for all six evening sessions. No fee will be charged, but due to the great demand for this series it will be necessary to obtain a card of admittance at the San Francisco Extension Center, 540 Powell St., prior to the first lecture.

OCT 15 1946

Atom Research Produces New Element

By Associated Press

BERKELEY, Calif., Oct. 15.—Atomic ovens can produce another chemical element which splits like uranium 235 and plutonium, Dr. Glenn T. Seaborg, nuclear research authority, disclosed yesterday.

The recently discovered substance is neptunium 237, an isotope or chemical twin of neptunium 239, the element which automatically changes into the plutonium used in atom bombs.

Dr. Seaborg, a University of California chemist, made his report in a paper prepared for delivery at a sectional meeting of the American Chemical Society.

Although neptunium 237, when bombarded with slow neutrons, undergoes fission as does U-235 and plutonium 239, the number of atoms which will split in any given quantity of the chemical is so low that it could not be used in atomic bombs, Seaborg said.

New Fissionable Element Found by U.C. Scientists

University of California scientists have discovered a new chemical which is fissionable like the elements used in the manufacture of the atomic bomb.

This announcement was made last night by Dr. Glenn T. Seaborg, U.C. chemistry professor, who was speaking at a regional meeting of the American Chemical Society at the Hotel Claremont.

The new element is neptunium 237, but Dr. Seaborg said it will not be suitable for atomic bomb use because fission occurs irregularly and might not set up the instant chain reaction for an explosion.

Further study will determine its eventual adaptability to industrial uses, he indicated.

The only other heavy elements publicly known to be fissionable until Seaborg's announcement were uranium, plutonium and thorium.

OTHER ADVANCES

Seaborg also revealed other advances made at the University of California cyclotron laboratory and the atomic ovens at Chinton, Tenn., and Hanford, Wash.

These include what is described as the biggest chemical element in the world—curium 242. As far as is known, this element exists only in a small vial at the University of California.

Because of its "jitteriness," the element has a half-life of only five months, compared to radium's half-life of 1600 years. A half-life is the period during which half of the element has broken down into energy and smaller atoms.

NEW DISCOVERIES

Other announcements made by Seaborg were:

Three new cousins of neptunium: 234, 235 and 236.

A new cousin of plutonium: 241.

A lightweight type of curium: 240.

The analysis of the recently created americium, with a mass of 241.

Pointing out that only large plants are now considered feasible for atomic energy production because of the many feet of steel and concrete needed to protect personnel from the deadly radiations accompanying the release of atomic energy, Seaborg said:

"One must not lose sight of the possibility that new improvements in shielding arrangements will make it possible to reduce appreciably the bulk of the installations."

Atomic energy can be put to work in such plants, he declared, "as soon as organized effort is exerted in this direction."

MARITIME USE

"There is no reason why atomic energy generating piles cannot eventually be adapted to seagoing vessels," Professor Seaborg said in pointing out that application of atomic power need not be limited to stationary structures. "It may even be feasible sometime in the future to use power plants of this type in large submarines, giving to such vessels the highly desirable advantage of extremely long cruising ranges. It is also probably not out of the question that such power plants might be used for the propulsion of some of the very large airplanes which are being planned for the future."

"Important as atomic energy may be in industry," Professor Seaborg concluded, "it may prove even more beneficial to mankind through its aid in the conquest of disease and in other fields of science. Radioactive isotopes, or variant forms of elements, which are produced during the development of atomic power can be employed to 'tag' atoms in the human body for tracer experiments in medicine, and for similar purposes in chemistry, physics and industrial research."

**SOUTHWEST
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KANSAS CITY, MO.
YOFEN & KAN.

OCT. 15, 1946
LINCOLN, NEB. STAR

New Element Is Capable Atom Fission

... IMPRACTICAL FOR BOMBS

BERKELEY, Cal. — (INS) —
University of California atom-
smashers gave the world today a
new element capable of atomic
fission.

Discovery of the new element
—Neptunium 237—was an-
nounced by Dr. Glenn T. Seaborg,
University of California chemistry
professor who played a leading
role in the development of the
atomic bomb.

Dr. Seaborg emphasized, how-
ever, that the new element lacks
the rapid chain-reacting prop-
erties of plutonium and is therefore
impractical for producing atomic
bombs.

Dr. Seaborg did not indicate
whether the new Neptunium fis-
sionable isotope will have any ap-
plication to atomic energy, where
a slower chain reaction is desir-
able.

However, he did predict that
the industrial use of atomic pow-
er on a far greater scale than is
now envisioned may be made
possible by improved methods of
shielding nuclear energy plants.

He pointed out that at present
only large plants are considered
feasible because of the many feet

of steel and concrete needed to
protect personnel from deadly ra-
diations. Dr. Seaborg added:

"One must not lose sight, how-
ever, of the possibility that new
improvements in shielding ar-
rangements will make it possible
to reduce appreciably the bulk
of such installations.

Transportation Uses.

He predicted the most immedi-
ate application of atomic energy
would be in stationary power
plants, particularly in areas iso-

lated from ordinary sources of
energy such as coal and water.

He also predicted its future ap-
plication to large ships, subma-
rines and very large airplanes.

Dr. Seaborg outlined the dis-
covery of the new fissionable
material to a regional meeting
of the American Chemistry so-
ciety in Berkeley last night and
also disclosed the discovery of
other isotopes of elements prom-
inent in the production of atomic
energy.

N.Y. HERALD TRIBUNE New Substance Is Discovered: Neptunium 237

Rare and Difficult to Make,
It Is a By-Product of
Atom-Splitting Process

Special to the Herald Tribune

BERKELEY, Calif., Oct. 14.—A
new element with the explosive
powers of uranium—but this time
a laboratory curiosity rather than
raw material for an atomic bomb
—was described today by Dr.
Glenn T. Seaborg, one of the
world's leading nuclear chemists
and co-discoverer of elements 95
and 96.

The new substance is an isotope
of neptunium, now listed as ele-
ment 93. In its better known state,
neptunium is a brief way station
on the nuclear road from uranium
238 to plutonium. But that is nep-
tunium 239. Dr. Seaborg's new ad-
dition is neptunium 237, and it is
quite long-lived.

Like uranium 235 and pluto-
nium, it splits in two, yielding high
energies. But unlike the other two
substances, it is both rare and
difficult to make. It occurs in small
quantities as a by-product of a
chain-reacting pile. So far, Dr.
Seaborg said, 1/300 of an ounce
has been purified.

Like its ephemeral twin, nep-
tunium 237 is made by neutron
bombardment from uranium 238.
When a neutron strikes uranium
238 it usually sticks to it, and the
uranium changes to neptunium.
But very occasionally, instead of
sticking, the neutron leaves at
once, taking another neutron with
it. The uranium obediently changes
to neptunium just the same, but it
is two masses lighter.

Dr. Seaborg's report was read
before a section meeting of the
American Chemical Society here,
and he chose the occasion to ex-
plore for them a good deal of the
"trans-uranic" field of chemistry—
chemistry dealing with elements
that were not even suspected a
few years ago.

In addition to neptunium 237,
Dr. Seaborg mentioned three other
isotopes of neptunium—234, 235
and 236. Plutonium now also has
an older brother, 241 as against
normal plutonium 239.

Dr. Seaborg revealed also some
new knowledge about the two ele-
ments he helped discover—element
95, americium, and 96, curium.
Americium, he said, has a half-life
of 500 years—that is to say it de-
cays at a rate such that, no matter
how much you have now, you have
half as much in 500 years. The
half-life of curium is five months.

Both are "alpha emitters," which
means that an atom of either de-
cays by emitting a packet contain-
ing two protons and two neutrons.

Putting the half-life and the
decay mechanism together, this
means that if you start today with
two atoms of americium, some time
in 2446 you will discover you have
only one atom of americium and
one of a substance with a mass of
237 and an atomic number of 93.
This, in turn, is neptunium 237.

Atomic Ovens Can Produce New Chemical Element Which Will Split Like Uranium, Plutonium

By Rennie Taylor

Berkeley, Calif., Oct. 14 (AP)—Atomic ovens can produce another chemical element which splits like uranium 235 and plutonium, Dr. Glenn T. Seaborg, Nuclear Research authority, disclosed today.

The recently discovered substance is neptunium 237, an isotope or chemical twin of neptunium 239, the element which automatically changes into the plutonium used in atom bombs.

Dr. Seaborg, a University of California chemist, made his report in a paper prepared for delivery at a sectional meeting of the American Chemical society tonight.

Although neptunium 237, when bombarded with slow neutrons, undergoes fission as does U-235 and plutonium 239, the number of atoms which will split in any given quantity of the chemical is so low that it could not be used in atomic bombs, Seaborg said.

He made no reference to the amount of energy released in the fission of neptunium 237. U-235 and

plutonium atoms release energies of about 200,000,000 volts, which gives them their destructive power.

However, he termed the new fission discovery "very interesting" from the scientific standpoint and said 100 milligrams, about one three-hundredth of an ounce, had been made for special chemical studies.

The first neptunium 237, was produced more than a year ago in the university's 225-inch cyclotron by Dr. Seaborg and Arthur C. Wahl. Seaborg said it now is a byproduct of plutonium production at Clinton, Tenn., and Hanford, Wash.

Dr. Seaborg also reported discovery of a new isotope of plutonium with an atomic weight of 241. Up to now only one form of the substance, the powerful U-239, has been revealed publicly.

Seaborg did not report any details of plutonium 241 except to say that it was produced by bombing the most common type of uranium, U-238, with alpha particles. They are the heaviest atom-smashing projectiles ordinarily used by the cyclotron.

He added that plutonium 241 was "relatively long-lived," which means that it does not change itself quickly into some other element by radioactivity. It does, however, eventually turn into an isotope of the newly discovered chemical element Americium without undergoing any change in atomic weight.

Neptunium Isotope-Twin Discovered

By RENNIE TAYLOR

Associated Press Staff

Atomic ovens can produce another chemical element which splits like uranium-235 and plutonium, Dr. Glenn T. Seaborg, nuclear research authority disclosed Monday.

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Dr. Seaborg also reported discovery of a new isotope of plutonium with an atomic weight of 241. Up to now only one form of the substance, the powerful U-239, has been revealed publicly.

SAN FRANCISCO EXAMINER 10/15/46

New Atomic Discovery Made at U. C. Cyclotron

Fission Element Not Suitable for Bombs But Possible Aid to Industry

Discovery of a fourth heavy element capable of atomic fission was announced last night by Dr. Glenn T. Seaborg, the University of California chemistry professor who played a leading role in development of the atomic bomb.

Seaborg told the American Chemical Society, meeting at the Claremont Hotel in Berkeley, that the element is neptunium 237, which was discovered at Berkeley.

REACTION SLOW—

He said it would not be suitable for use in an atomic bomb because the fission occurs too rarely to set up the instant chain reaction needed for an explosion.

Whether the discovery will have an importance in the industrial use of atomic energy, where a slow chain reaction is desirable, remains to be seen.

Until Seaborg's announcement, the only heavy elements known publicly to be fissionable were uranium, plutonium and thorium.

Fission of neptunium 237 was achieved by bombarding it with slow neutrons, he said. He said the fission occurred only a small fraction of the number of times it occurs with plutonium, the explosive atom of the Nagasaki bomb.

NEW FACTS—

Seaborg also told the society that university researchers have established a number of fundamental facts about the new trans-uranic elements—neptunium, plutonium, americium and curium—all of which were discovered at Berkeley by cyclotron bombardment.

He said they have isolated four isotopes, or "sisters" of neptunium 239. They are neptunium 234, 235, 236 and 237. Also discovered were an isotope of plutonium 239, designated as plutonium 241, and two curium isotopes, with mass numbers of 240 and 242. The latter is now the heaviest element known to man.

This isotope emits beta particles over a very long period of time compared to the other isotope of Plutonium 239, which has a half-life of 24,000 years. Plutonium 239 was used in the atomic bomb which was dropped on Nagasaki.

OTHER DISCOVERIES

Dr. Seaborg was reported that three new isotopes of Neptunium known as 234, 235 and 236 have also been discovered in the 225-ton cyclotron in Crocker Laboratory.

Neptunium 234 has a half-life—or period in which one-half of a given number of its atoms lose their radioactivity—of 4.4 days—compared with eight months for 235 and 20 hours for 236, he said.

These new isotopes were produced by bombardment of Uranium with 22,000,000-electron volt deuterons and 44,000,000-electron volt alpha particles in the newly-rebuilt 225-ton cyclotron.

Use of these new high-energy particles were made possible early last year when Dr. J. G. Hamilton and his associates rebuilt the Berkeley Radiation Laboratory to double energies previously attained.

MASS NUMBERS

The Berkeley chemist, in a third report, revealed the mass numbers and half-lives of known isotopes of Americium and Curium, the synthetic trans-uranic elements numbered 95 and 96 which were produced at Berkeley last year.

Americium has a 500-year half life while the mass number of the known isotope is 241.

Two Curium isotopes have half lives of one month and five months with mass numbers of 240 and 242 respectively. These make the highest mass numbers for an isotope. The previously highest was number of 239 was known in Uranium, Neptunium and Plutonium.

AID EXPERIMENT

Dr. Seaborg said that most of the new observations were done by members of the University of California's Department of Chemistry. Included were R. A. James, A. E. Florin, H. H. Hopkins and A. Ghiorso.

Bombardments of elements were carried on by the staff of the Radioation Laboratory under direction of Dr. Joseph G. Hamilton.

18 Oakland Post-Enquirer
Tuesday, Oct. 15 FC

New Atom Isotope

Discovery Bared By U. C. Savant

Discovery of a new isotope or sister component of Element 93—Neptunium—which is capable of atomic fission, was revealed today by a University of California scientist.

The discovery was reported by Dr. Glenn T. Seaborg, University of California chemistry professor, at a meeting of the California Section of the American Chemical Society in the Hotel Claremont last night.

Dr. Seaborg said that the new isotope, Neptunium 237, could not be used in atomic bombs because of its low rate of fission.

THIRD ONE

This is the third element in which fission by slow neutron bombardment has been reported, the other two being Uranium 235 and Plutonium 239, he said.

Dr. Seaborg also reported that a "relatively long-lived" isotope of Plutonium 241 was produced in the 225-ton cyclotron on the University of California campus in Berkeley by bombarding Uranium 238 with alpha particles.

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TOPEKA, KAN.

OCT. 15, 1946
SATON ENGINE LA. ADVOCATE

Atomic Ovens Can Produce New Chemical Element Which Will Split Like Uranium, Plutonium

By Rennie Taylor

Berkeley, Calif., Oct. 14 (AP)—Atomic ovens can produce another chemical element which splits like uranium 235 and plutonium, Dr. Glenn H. Seaborg, Nuclear Research authority, disclosed today.

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Dr. Seaborg, a University of California chemist, made his report in a paper prepared for delivery at a sectional meeting of the American Chemical Society tonight.

Although neptunium 237, when bombarded with slow neutrons, undergoes fission as does U-235 and plutonium 239, the number of atoms which will split in any given quantity of the chemical is so low that it could not be used in atomic bombs, Seaborg said.

He made no reference to the amount of energy released in the fission of neptunium 237, U-235 and

plutonium atoms release energies of about 200,000,000 volts, which gives them their destructive power.

However, he termed the new fission discovery "very interesting" from the scientific standpoint and said 100 milligrams, about one three-hundredth of an ounce, had been made for special chemical studies.

The first neptunium 237, was produced more than a year ago in the university's 225-inch cyclotron by Dr. Seaborg and Arthur C. Wahl. Seaborg said it now is a byproduct of plutonium production at Clinton, Tenn., and Hanford, Wash.

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LOUISVILLE KY. TIMES
OCT. 15, 1946

Ultimate Futility

An artificially produced chemical element which splits like uranium is announced to the American Chemical Society by Dr. GLENN H. SEABORG, University of California authority on nuclear research.

If this adds to the worry about atomic warfare, it exposes the ultimate futility of such precautions as trying to control sources of uranium deposits. Atoms are atoms and all are capable of explosive force when their constituents are released under certain conditions.

Scientists found they could make uranium active. The trick having been learned, it became certain that ways would be developed to duplicate it on other substances or to alter the balance of their constituents so as act like uranium.

There are no fundamental secrets about nuclear fission except those still hidden from everybody.

10/15/46

New Atomic Developments Announced by Seaborg

By Jack Bik '49 and Walter Slosson '49

The discovery that an isotope of neptunium is capable of producing atomic energy was announced last night by Glenn T. Seaborg, professor of chemistry, at a meeting of the California section of the American Chemical Society at the Claremont hotel.

Also announced were the discoveries of another isotope of plutonium and three new isotopes of neptunium and the fact that there are two known isotopes of curium.

Neptunium is the third element in which fission by slow neutrons has been reported, the other two being uranium 235 and plutonium 239, both of which were used in atomic bombs that were dropped over Japan. However, the occurrence of fission in the isotope, neptunium 237, is so infrequent that it could not be used in an atomic bomb, Seaborg said.

Other discoveries Seaborg reported included:

1. A second isotope of plutonium 241, which was produced in the 225-ton cyclotron in the Crocker Radiation laboratory by bombarding uranium 238 with Alpha particles. Seaborg described it as "a relatively long-lived" emitter of Beta particles, the penetrating particles loosed in the decay of many radioactive elements.

Its radioactivity continues to exist over a relatively long period of time. The other isotope, plutonium 239, has a half-life of 24,000 years. Only the existence of plutonium 239 had previously been made public.

2. The recent discovery of three new isotopes of neptunium 234, 235, and 236. They were produced by the 225-ton cyclotron. Neptunium 234 has a half-life, or period in which one-half of a given number of its atoms lose their radioactivity, of 4.4 days; neptunium 235 has a half-life of eight months; while neptunium 236 has a half-life of 20 hours.

3. The mass numbers and half-lives of the known isotopes of americium and curium, trans-uranic elements 95 and 96 produced last year in Berkeley, were announced. The half-life of americium's only known isotope, 241, was found to be 500 years. Curium 240 has a half-life of one month and curium 242 of five months.

Dr. Seaborg described americium 241 as being the "daughter" of plutonium 241 since it was produced by bombarding uranium 238 with Alpha particles. The two curium isotopes were produced by bombarding plutonium 239 with the same Alpha particles.

The highest previously reported mass number for an isotope was 239.

There are isotopes of mass number 239 for uranium, neptunium, and plutonium.

Seaborg also told how the new neptunium isotopes were produced by bombardment of uranium with both 22 million electron volt deuterons, the nuclei of heavy hydrogen, and 44 million electron volt Alpha particles, helium nuclei, in the 225-ton cyclotron.

Scientists Hear Of Finding New Atomic Element

Berkeley, Cal., Oct. 14 (AP).—Atomic ovens can produce another chemical element which splits like uranium-235 and plutonium, Dr. Glenn T. Seaborg, nuclear research authority, disclosed today.

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New Heavier Plutonium Also Revealed for First Time.

Dr. Seaborg also reported discovery of a new isotope of plutonium with an atomic weight of 241. Up to now only one form of the substance, the powerful U-239, has been revealed publicly.

Seaborg did not report any details of plutonium 241 except to say that it was produced by bombing the most common type of uranium, U-238, with alpha particles. They are the heaviest atom-smashing projectiles ordinarily used by the cyclotron.

He added that plutonium 241 was "relatively long-lived," which means that it does not change itself quickly into some other element by radioactivity. It does, however, eventually turn into an isotope of the newly discovered chemical element americium without undergoing any change in atomic weight.

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OCT. 15, 1946
LITTLE ROCK, ARK. GAZETTE

FIND THIRD SPLITTING ATOM.

Neptunium 237, However, Cannot Be Used in A-Bombs.

BERKELEY, CALIF., Oct. 15.(AP)—Atomic ovens can produce another element which splits like uranium 235 and plutonium, Dr. Glen T. Seaborg, nuclear research authority, disclosed today.

The recently discovered substance is neptunium 237, an isotope or chemical twin of neptunium 239, the element which automatically changes into the plutonium used in atom bombs.

Dr. Seaborg, a University of California chemist, made his report in a paper prepared for delivery at a sectional meeting of the American Chemical society last night.

Although neptunium 237, when bombarded with slow neutrons, undergoes fission as does U-235 and plutonium 239, the number of atoms which will split in any given quantity of the chemical is so low that it could not be used in atom bombs, Seaborg said.

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OCT. 15. 1946

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KANSAS CITY, MO. STAR

Seaborg Tells Of New Atomic Discoveries

Work On Three New Radioactive Elements Described To American Chemical Society

By Jack Bik '49

The heaviest element in the world is now on this campus, according to disclosures made by Glenn T. Seaborg, professor of chemistry, at a meeting of the California section of the American Chemical society Monday night.

The element is called curium 242, to distinguish it from curium 240, discovery of which was also announced at the meeting. This is the first mention of the existence of two types of curium which Seaborg and his crew of chemists had created several months ago.

Curium 242 emits many rays and is so unstable that, by the time five months have passed, half of it has

gone off in the air as energy or has turned into something else.

Americium, which was discovered at the same time as curium, has a half-life, on the other hand, of five hundred years.

These elements are among the several recently produced in the Crocker Radiation laboratory since Joseph G. Hamilton, assistant professor of medicine and radiology, rebuilt the 225-ton cyclotron there.

Another of the newly found elements, called neptunium 237, is important in as much as it is the third element discovered so far that produces atomic energy. The other two have been used in the atomic bomb. Neptunium 237, however, is not expected to be capable of causing explosions.

Neptunium was first discovered several years ago when the scientists on the atom bomb project were hunting for some material to use in their work. Their discovery was neptunium 239, which did not split its atoms. It was from this material, however, that they finally produced the plutonium 239, which was used so disastrously over Nagasaki.

The revolutionary aspect of these discoveries is that there were only 92 elements previous to 1940 and it was thought impossible to create any new ones. Since then, due in large part to the work of University scientists, four of these new elements have been "made" by placing specimens of some other element in a cyclotron and bombarding them with tiny sub-atomic "bullets."

Seaborg Will Consider Future of Atomic Energy During Extension Lecture Today

What is the future of atomic energy?

This is one of the questions that Glenn T. Seaborg, professor of chemistry, will attempt to answer at 8 p.m. today in a lecture to be given at the University Extension center in San Francisco.

In his talk, entitled "Chemical Aspects of Atomic Energy," Seaborg will first trace the role which chemistry and chemical engineering play in the manufacture and use of fissionable material — such as plutonium. The practical uses to which atomic energy may be put will also be considered.

One of the discoverers of plutonium, Seaborg is currently directing a group of chemists in the Radiation laboratory doing research work on the newly-discovered trans-uranium elements.

BERKELEY GAZETTE 10/19/46
KIRKBY TEX. COURIER
OCT. 18, 1946

U. OF C. HEADS DISCOVER NEW ATOM ELEMENT

BERKELEY, Cal. (INS)—University of California Atom Smashers gave to the world today a new element capable of atomic fission.

Discovery of the new element—Neptunium 237—was announced by Dr. Glenn T. Seaborg, University of California chemistry professor, who played a leading role in the development of the atomic bomb.

Dr. Seaborg emphasized, however, that the new element lacks the rapid chain-reacting properties of Plutonium and is therefore impractical for producing atomic bombs.

Dr. Seaborg did not indicate whether the new neptunium fissionable will have any application to atomic energy, where a slower chain reaction is desirable.

However, he did predict that the industrial use of atomic power on a far greater scale than is now envisioned may be made possible by improved methods of shielding nuclear energy plants.

He pointed out that at present only large plants are considered feasible because of the many feet of steel and concrete needed to protect personnel from deadly radiations. Dr. Seaborg added:

"One must not lose sight, however, of the possibility that new improvements in shielding arrangements will make it possible to reduce appreciably the bulk of such installations.

He predicted the most immediate application of atomic energy would be in stationary power plants, particularly in areas isolated from ordinary sources of energy such as coal and water.

He also predicted its future application to large ships, submarines and very large airplanes.

UC Professor Sees Production Of Isotopes as Major Industry

Production of radioactive isotopes is destined to become a major chemical industry, Dr. Glenn T. Seaborg, professor of chemistry at the University of California and a leading researcher on the atomic bomb project, told an audience at the University Extension Center in San Francisco last night.

Dr. Seaborg said that radioactive isotopes, formerly produced only by cyclotrons and similar atom-smashing machines in small quantity, can now be made in large quantity by the chain reacting pile technique used to produce plutonium for the atomic bomb.

These radioactive substances, he added, can be used in practically every field of scientific and industrial research.

"This operation will become such a vast one in the future to the development of a large demand for such radioactive tracer isotopes that it will soon become what might be called a major chemical industry," Dr. Seaborg said.

Dr. Seaborg cited a number of examples of how the isotopes can be used in different fields.

"The incorporation of radioactive carbon 14 into the molecules of the great substances penicillin and streptomycin might lead to a better understanding of how these substances work," Dr. Seaborg suggested. "It will also be possible to use such tracer isotopes to study the mechanism by which cancer develops. Once this mechanism is understood there will be a much better chance for working out preventive measures or cures."

Dr. Seaborg outlined the discovery of the new fissionable material to a regional meeting of the American Chemistry Society in Berkeley last night and also disclosed the discovery of other isotopes of elements prominent in the production of atomic energy.

Three other isotopes of neptunium—234, 235 and 236—have also been produced, he said. As in the case of neptunium 237, they were produced at the Berkeley Radiation laboratories' cyclotron. The isotopes were produced from neptunium extracted from the chain-reacting piles at Clinton, Tenn., Hanford, Wash.

Neptunium, in turn, is a by-product of plutonium production, the potent element 94 which was used in the Nagasaki bomb.

Dr. Seaborg said three other trans-uranic elements produced in making fissionable material have also disclosed isotopes. These are plutonium 241, curium 240 and 242 and Americium 241, the latter a "daughter" of plutonium 241, produced by bombarding uranium.

Curium 242 is now the heaviest matter known to man, as the highest previously reported mass number for an isotope was 239, occurring in uranium, neptunium and plutonium.

Plutonium 241 was described as a "relatively long-lived" emitter of beta particles, the strong, penetrating particles loosed in the decay of radioactive elements. This means its radioactivity exists over a long period of time, similar to radium's life cycle.

Most of the observations of the new neptunium isotopes were done by University of California chemists R. A. James, A. E. Florin, N. H. Hopkins and A. Chiorso and M. H. Studier and E. Hyde of the University of Chicago Metallurgical Laboratory.

Third Source of Nuclear Energy Cited by Seaborg

BY GEORGE DUSHECK

Dr. Glenn T. Seaborg, University of California chemist who discovered plutonium, the Nagasaki atom bomb material, last night made the first public reference to a third available source of nuclear energy, the uranium isotope U-233.

He said U-233 was manufactured in a "pile" from thorium, and that it could be added to U-235, the isotope of uranium used in the Hiroshima atom bomb, and plutonium as a "readily fissionable material."

Speaking to an audience of more than 500 persons in the auditorium of the University Extension at 540 Powell-st., Dr. Seaborg said a pamphlet released by the United Nations Atomic Energy Commission earlier this week referred to the new isotope.

He said U-233 does not occur in nature as a fraction of natural uranium, as does U-235, but must be manufactured in a "pile" from thorium and separated chemically.

The United Nations report to which Dr. Glenn T. Seaborg referred in revealing the existence of a new atom bomb material last night was transmitted to the United Nations Atomic Energy Commission on Sept. 27 by a scientific and technical subcommittee headed by Professor H. A. Kramers.

The United Nations report says in part:

"There are three nuclear fuels (U-235, U-239 and U-233) which can be used in a sustained chain reaction yielding enormous quantities of heat, radiations, and radioactive materials." Pu-239 is plutonium.

After referring to the primary role of uranium in atomic energy research, and to the fact that the fissionable isotope U-235 occurs as one part in 140 in natural uranium, the United Nations report states:

"Two new materials"—meaning synthetic materials—(plutonium-239 and uranium-233) "can be formed from U-238 and thorium in nuclear fires burning U-235.

"Thorium as a source of nuclear fire (U-233) differs from uranium in containing no 'inflammable' fraction, corresponding to the U-235 in uranium. Thorium can, therefore, be used in a reactor (pile) as a source of U-233 only if nuclear fuels are also added." Presumably these added nuclear fuels would be either U-235 or plutonium.



EXPERT.—Dr. Glenn Seaborg reveals atomic views.

"Uranium and thorium are, as far as can be foreseen, the only naturally occurring substances from which nuclear fuel in significant quantities can be produced," the United Nations report says. "These substances play a fundamental and unique role in the control of atomic energy.

"Thorium occurs principally in monazite sands in India, Brazil, the Dutch East Indies, Australia and elsewhere," the United Nations report states.

The "elsewhere" includes the sands of California, according to a report on rare earths made last year by the Division of Mines of the State Department of Natural Resources.

The report, entitled "Commercial Minerals of California" and written by Walter W. Bradley, state mineralogist, and George L. Gary, mineral technologist, says that thorium-

bearing monazite sands are found in Butte, El Dorado, Placer, Yuba, Del Norte, Humboldt, Plumas and Riverside Counties.

"It has been observed in the black sands at Crescent City . . . in the concentrates of the 'Indian Diggins' district . . . at Nelson Point . . . in the black sands of Little Rock Creek . . . in the Jurupa Mountains," the state report says.

Thorium constitutes from 0.5 to 20 per cent of monazite sands, the state report says. Owing to the presence of the thorium, the monazite is radioactive. Thorium was mined commercially for many years after 1885 for use as thorium oxide in an incandescent gas mantle. This use disappeared with the spread of electric lighting.

During the period when monazite was a commercial ore it was mined in North Carolina, Brazil, Ceylon and Travancore. By 1910 the price of thorium oxide had dropped from the 1890 high of \$125 a pound to \$2.50. Thorium is still used in some "electron emissive elements" (electronic tubes) and monazite was quoted in *The Engineering & Mining Journal* of Oct. 18, 1945, at \$60 a ton.

DAILY CALIFORNIAN 10/21/46

Seaborg Predicts Development Of New Chemical Industry

By Jack Bik '49

The rise of a new chemical industry was forecast by Glenn T. Seaborg, professor of chemistry, at a public lecture given Friday night at the University Extension center in San Francisco.

This industry will be the result of the large demand for radioactive tracers or "tagged atoms" which is fast developing, he said.

"Tagging" an atom consists of treating an atom so that it will emit rays, in order that its presence can always be detected, no matter where it is. This makes it very useful in medical and chemical research and in many fields of industry, Seaborg explained.

The rise of this new industry will be the first benefit the average man will receive from atomic energy, Seaborg thinks.

Before the advent of the atom bomb, it was possible to produce small amounts of radioactive materials for limited usage by means of the cyclotron. Now, however, common chemicals can be made radioactive by placing them in the same chemical "ovens" in which plutonium is produced. "By this means it is possible to produce tremendous amounts of these radioactivities," he asserted.

Seaborg also made the first public reference to a new major source of atomic energy, U-233.

U. C. REPORTS NEW ATOMIC DEVELOPMENTS

BERKELEY, Oct. 22.—Professor Glenn T. Seaborg, noted nuclear chemist on the Berkeley campus of the University of California, has reported a number of new isotopes, or sister components, of the heavy transuranic elements and some of their characteristics.

He has reported the following previously unpublished developments:

1. The discovery of three new isotopes of neptunium, element 93, with mass numbers of 234, 235, and 236.

2. Neptunium 237, a previously reported isotope, undergoes fission with slow neutrons, the process which produces the atomic bomb explosion. It is not useful for a bomb, however, because fission occurs only a fraction of the number of times in a given quantity as in the same quantity of uranium 235 or plutonium 239.

3. The existence of plutonium 241, the second reported isotope of the synthetic element 94 which was used in the Nagasaki atomic bomb.

4. There are two known isotopes of curium, element 96, which have mass numbers 240 and 242.

All of these elements are synthetic and radioactive and were first produced by bombardment in Professor Ernest O. Lawrence's 225-ton cyclotron. The bombardments were directed by Dr. Joseph G. Hamilton, of the Radiation Laboratory. Observations on the new elements were carried on by a group of chemists working under Dr. Seaborg at Berkeley and at the University of Chicago.

UC Atomic Research Described

TRIBUNE
10/24/46

One of the Isotopes, or sister components of Neptunium, element 93, is capable of atomic fission by slow neutron bombardment, it was reported last night by Dr. Glenn T. Seaborg, professor of chemistry at the University of California, in an address before the monthly meeting here of the California Section of the American Chemical Society.

Prof. Seaborg said that the occurrence of fission in the isotope, Neptunium 237, is so infrequent that it could not be used in an atomic bomb.

In any given amount of Neptunium 237 fission, the process in which a neutron splits a heavy nucleus to produce atomic energy, occurs only a fraction of the number of times the same reaction occurs in the same quantity of Plutonium, the potent element 94 which was used in the Nagasaki missile. This is the third element in which fission by slow neutrons has been reported, the other two being Uranium 235, and Plutonium 239.

Prof. Seaborg also made public the following:

1. A second isotope of Plutonium, 241, which was produced in the 225-ton cyclotron at the University of California by bombarding Uranium 238 with alpha particles. Dr. Seaborg described it as "a relatively long-lived" emitter of beta particles, the strong, penetrating particles loosed in the decay of many radioactive elements. This means its radioactivity continues to exist over a relatively long period of time. The other isotope of Plutonium, 239, has a half-life of 24,000 years. Only one isotope, 239, used in the Nagasaki bomb, has been known to the public previously.

RECENT DISCOVERY

2. The recent discovery with Prof. Ernest O. Lawrence's 225-ton cyclotron in the Crocker Laboratory at the University of California, of three new isotopes of Neptunium, 234, 235, and 236.

3. The mass numbers and half-lives of the known isotopes of Americium and Curium, the synthetic trans-uranic elements 95 and 96 which were produced at

Berkeley last year; and the fact that there are two known isotopes of curium.

Prof. Seaborg said that the new Neptunium isotopes were produced by bombardment of Uranium with 22 million electron volt deuterons, the nuclei of heavy hydrogen, and 44 million electron volt alpha particles, the nuclei of helium, in the 225-ton cyclotron. These extremely high energy particles were made possible early in 1945 when the cyclotron was rebuilt by Dr. J. G. Hamilton and his associates in the Berkeley Radiation Laboratory to produce particles of nearly double the previous energy. It was with such high energy particles that Americium and Curium were produced.

Neptunium 234 has a half-life, or period in which one half of a given number of its atoms lose their radioactivity, of 4.4 days; Neptunium 235 has a half life of 8 months; while Neptunium 236 has a half-life of 20 hours.

CURIUM ISOTOPES

The chemist reported that the half-life of Americium is 500 years, and the mass number of the known isotope is 241. He said that the mass numbers of the two Curium isotopes are 240, with a half-life of one month, and 242, with a half-life of 5 months. Americium 241 is the "daughter" of Plutonium 241, which was produced by bombarding Uranium 238 with alpha particles; the two Curium isotopes by bombarding Plutonium 239 with the same particles.

The highest previously reported mass number for an isotope was 239; there are isotopes of mass number 239 for Uranium, Neptunium, and Plutonium.

Prof. Seaborg revealed that Neptunium is produced as a by-product, though in much smaller quantities, of Plutonium production in the chain-reacting piles at Clinton, Tenn., and Hanford, Washington.

By means of special chemical extraction processes, it has been possible to extract more than 100 milligrams of Neptunium for chemical studies of Neptunium.

Dr. Seaborg said that most of the observations of the new isotopes of Neptunium were done by members of the University of California department of chemistry, including R. A. James, A. E. Florin, H. H. Hopkins and A. Ghiorso, and M. H. Studier and E. Hyde, of the University of Chicago Metallurgical Laboratory.

The bombardments producing elements 95 and 96 and the new isotopes of Neptunium were carried on by the staff of the Radiation Laboratory under the direction of Dr. Joseph G. Hamilton.

CHEM. AND ENGINEERING NEWS

Seaborg Announces Fissionable Neptunium

10/25/46

The discovery of a fissionable isotope of neptunium was announced by Glenn T. Seaborg, professor of chemistry at the University of California, at a meeting of the California Section of the AMERICAN CHEMICAL SOCIETY on October 14. The new isotope, Np^{237} , undergoes fission upon bombardment with slow neutrons, but the number of atoms which split in any given quantity is so low that it could not be used in atomic bombs, according to Dr. Seaborg.

Np^{237} was first produced in 1942 by Dr. Seaborg and Arthur C. Wahl in the 60-inch cyclotron at Berkeley, but its fissionable tendency and low fission cross section (2×10^{-28} sq. cm.) were discovered by A. Ghiorso, D. W. Osborne, and L. B. Magnusson, work-

ing with Dr. Seaborg at the metallurgical laboratory, University of Chicago. Np^{237} is among the by-products of plutonium production at the Clinton and Hanford plants.

Dr. Seaborg also reported the discovery of a new isotope of plutonium, Pu^{241} , and announced the mass numbers of the elements, americium and curium. Pu^{241} is produced by alpha particle bombardment of U^{238} . It has a relatively long half-life and forms an isotope of americium by beta-emission.

Am^{241} (element 95) is an alpha-emitter and has a half-life of 500 years. Curium (element 96) has two alpha-emitting isotopes, with mass numbers 240 and 242. Their half-lives are one month and five months, respectively.

PLUTONIUM AND NUCLEAR ENERGY

• Abstract of an address by Dr. Glenn T. Seaborg, Department of Chemistry, University of California, before the Assembly, October meeting.

Discovery of Plutonium

Following the discovery of neptunium, the next transuranium element to be discovered was that of atomic number 94, during late 1940 and early 1941 at the University of California. The particular isotope involved was that of mass 238, formed by the deuteron bombardment of uranium in the cyclotron of E. O. Lawrence. This led to the identification of a new isotope of neptunium, later shown to be the 2.0 day beta-particle emitter, Np^{238} , formed from a (d, 2n) reaction on U^{238} . This isotope of element 93 decays to an alpha-emitting isotope of element 94 (94^{238}), and this alpha-emitter has a half-life of about 50 years. The early experiments on the chemistry of element 94 employed this isotope and were performed by tracer

techniques. These showed that element 94 also has at least two oxidation states: an upper state (or states) and a lower state (or states). It was found that even stronger oxidizing agents are required to oxidize element 94 to the upper state than is the case for neptunium. Element 94 was given the name plutonium to follow the convention which was used in the naming of neptunium.

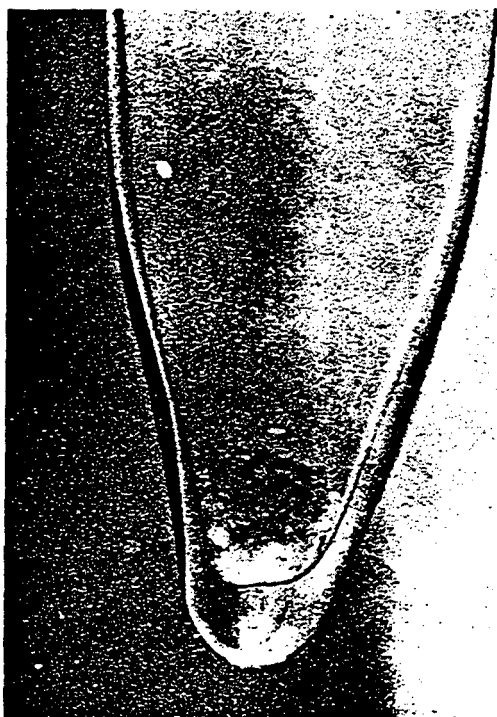
Importance of Pu^{239}

The isotope of plutonium which is of major importance is the isotope of mass 239. This isotope, Pu^{239} , which is the daughter of the 2.3 day Np^{239} , was discovered in March, 1941. It is an alpha emitter with a half-life of 24,000 years. Its tremendous importance stems from its property of being fissionable with slow neutrons, a property which places it in a class of importance comparable with that of U^{235} .

Once the value of the isotope Pu^{239} was thus definitely established, the paramount problem was that of producing it on a large scale, and the story of the accomplishment of this is the story of the Plutonium Project. The advantages of an isotope like Pu^{239} for mass production can readily be seen because the separation problem here resolves itself into chemical separation of elements, plutonium from uranium and fission products; whereas, in the case of the production of the isotope U^{235} , it is necessary to resort to the complex and laborious procedures of isotope separation.

Development of Plutonium Separation Process

The early work of the chemistry group at the University of California formed the basis for the later development of the separation process. The process now used in the separation of plutonium from uranium and fission products in the large manufacturing plants is based upon the use of the two oxidation states of plutonium, and a great deal of the earliest work was concerned with the study of these states on the tracer scale. A pure chemical compound of plutoni-



Twenty micrograms of pure plutonium hydroxide in capillary tube (magnified about 40-fold) isolated in September, 1942. The plutonium is the cloud-like mass at the bottom of the capillary "test tube."

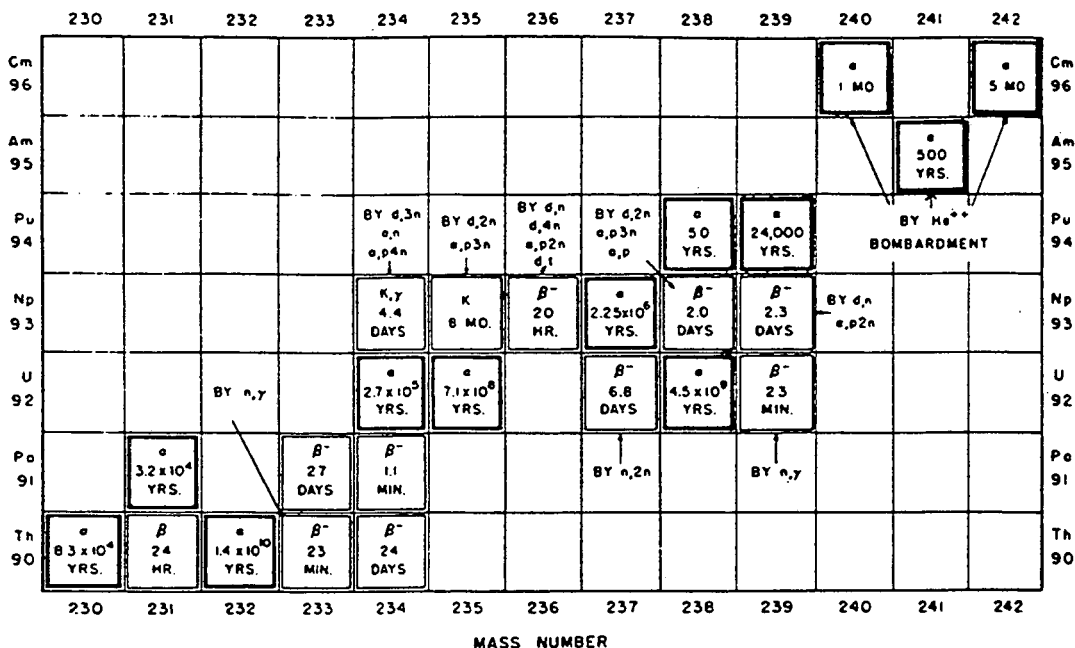


CHART SHOWING SOME NEW HEAVY ISOTOPES

um, free of carrier material and all other foreign matter was finally prepared by B. B. Cunningham and L. B. Werner at the Metallurgical Laboratory in Chicago on August 18, 1942. There were available to these men for the accomplishment of this feat only a couple of micrograms of plutonium produced by the bombardment of uranium by neutrons from the Berkeley cyclotron. *This memorable day will go down in scientific history to mark the first sight of a synthetic element and the first isolation of a weighable amount of an artificially produced isotope of any element.*

During the summer of 1942 large amounts of uranium (hundreds of pounds) were bombarded for several months in the cyclotrons of the University of California, Berkeley, and Washington University, St. Louis. This resulted in the production of a couple of hundred micrograms of plutonium—happily, a great deal more than had been anticipated—and made it possible to extend considerably the program of ultra-microchemical investigation. In September, 1942, Cunningham and Werner were able to prepare a number of com-

pounds of pure plutonium and to determine with certainty, by means of chemical analysis, that the oxidation number of the most stable state of the element in solution is IV. The group remaining in Berkeley with W. M. Latimer, including A. C. Wahl, J. W. Hamaker and G. E. Sheline, also contributed to this ultra-microchemical program of investigation and were able to show that the oxidation number of the highest oxidation state is VI. In addition, R. E. Connick established the existence of the III state. From this time until the end of 1943 these cyclotron bombardments were the sole source of plutonium, and over this period of time about 1,000 μg, or 1 mg. of plutonium were prepared. Preparation of compounds of plutonium and measurement of such properties as solubility and oxidation potentials were achieved with this material.

Work on Physical and Chemical Properties of Plutonium

In addition to the need for work with pure plutonium in connection with the separation process, it was necessary to determine a number of the physical and chemical properties of the dry salts of

plutonium and of plutonium metal. Therefore, the investigation on the ultramicro scale had to encompass this field of investigation also. A number of compounds of plutonium were prepared by reactions involving the solid and gas phase—that is, by dry chemical reactions. This work was done in collaboration with Dr. Zachariassen of the University of Chicago staff, who was able to use his X-ray technique to identify or help identify a number of the compounds which were synthesized and, in many cases, thus to establish their chemical structure. Another feat accomplished with only microchemical amounts of plutonium was the preparation of plutonium metal and the study of some of its properties. This was done by P. L. Kirk and H. L. Baumbach and those working with them in their groups.

Later in the history of the Plutonium Project, larger amounts of this element became available to the chemists as a

result of successful operation of the chain reacting units and chemical extraction plants. This made it possible to continue the investigation of the chemical properties of plutonium at an accelerated rate, using the methods of ordinary chemistry. As a result of all these basic chemical studies of plutonium it has been established that its oxidation states in solution are VI, V, IV and III, and that there is a shift in stability toward the III state as compared to neptunium and uranium.

Two Wacs were being followed by a soldier. Finally one became indignant and, turning to the soldier, said:

"Either quit following us or go and get a friend."

BAD ENOUGH

Affable Butcher: "I trust, madam, that you liked the sausages?"

"Well, I must admit," replied the customer acidly, "they were not quite so bad as they were tainted."

October Speakers



HEAR MATTERS PLUTONIC AND NUCLEONIC AS SEABORG ENVISIONS EMISSIONS AND FISSIONS

Glenn T. Seaborg was born in Ishpeming, Michigan, April 19, 1912, and received his training in chemistry at the University of California at Los Angeles (B.A. 1934) and at the University of California at Berkeley (Ph.D. 1937). Following his formal training, he served for two years (1937-39) as research associate with Professor Gilbert N. Lewis and was then appointed as an instructor in the College of Chemistry of the University of California at Berkeley. In 1941, he was promoted to the rank of Assistant Professor; and, in 1945, in recognition of his outstanding work, was raised to a full professorship. His main field of research has been nuclear chemistry and nuclear physics.

In 1940 he was co-discoverer of the element plutonium at the University of

California. Since that time, his studies have been largely in connection with the application of plutonium to atomic energy. From April, 1942, until May, 1946, he was on leave of absence from his university for work at the Metallurgical Laboratory of the University of Chicago. Here he was primarily responsible for the development of the chemical separation procedures which were used in the manufacture of plutonium at Clinton, Tennessee, and Hanford, Washington. Recently he was co-discoverer of americium (Element 95) and curium (Element 96) at the Metallurgical Laboratory. Since 1936, Dr. Seaborg has published about fifty papers on the general subject of nuclear physics, artificial radioactivity, and the applications of artificial radioactivity to chemistry, including comprehensive reviews and compilations in *Reviews of Modern Physics* and *Chemical Reviews*. He is a member of the American Chemical Society, AAAS, Sigma Xi, and a fellow of the American Physical Society.

The discussion will center primarily around the chemical developments and achievements in the nuclear energy field, with most of the emphasis placed on the important new synthetic element, plutonium. The development of the chemical procedures which are used for the extraction of plutonium from uranium and fission products at the plutonium production plants will be described with particular emphasis placed upon the interesting work which was done with microgram quantities of material in the early days when no more than this amount of plutonium was available for the whole chemical research program.

The talk will include a discussion of the discovery and study of a number of interesting new transuranium isotopes and also a discussion of the prospects for the commercial applications of nuclear energy.

HE PLAYS WITH ATOMS

FORTNIGHT

11/19/46

WHEN Dr. Glenn T. Seaborg, 34-year-old nuclear chemist of the University of California, dedicated his life to science, the U.S. lost a good public official.

Widely known in science circles because of his extremely advanced thinking, he talks of his own life as if it were only another problem in radiochemistry, which perhaps it is.

By the time the Chicago Junior Association of Commerce named him outstanding young man of Chicago for 1945 he had already outdistanced most of his contemporaries: full professor, co-discoverer of plutonium and its important isotope of mass 239, recognized atomic research authority mentioned in the same breath with U.C.'s brilliant physics department head, Dr. E. O. Lawrence (see *Science and Invention*), whose pioneering first attracted Seaborg from U.C.L.A. in 1934.

Seaborg from 1942 to 1945 worked with plutonium when the only quantities available were a thousand times smaller than were ever used in such experiments before. Everyone, including Harvard's scientist president, James Conant, said it couldn't be done in less than five years. Yet in three years, Seaborg and his associates in the University of Chicago's Metallurgical Institute successfully developed the techniques behind the Nagasaki A-bomb. It was after this event that his work first became known to the general public.

That first year they all worked 12-14 hours a day, regularly took time out for golf to avoid going mentally stale.

"I tried always to keep my eye on the practical objectives," Seaborg smiles, "not getting sidetracked on the more interesting *basic* things."

Meanwhile Seaborg's name is continually in the news from U.C.'s hyperactive science laboratories. He has discovered so many isotopes of common elements that he refers to the total number carelessly as "several dozen." He is also co-discoverer of elements 95 and 96, trans-uranic elements still unnamed. He stresses, however, that all these discoveries he merely shared with others: E. O. Lawrence, L. O. Morgan, R. A. James, A. C. Wahl, E. Segre, E. M. McMillan, J. W. Kennedy.



Dr. Glenn Seaborg

Michigan-born of Swedish parents, Seaborg moved to South Gate, California, when he was ten. He proudly recalls the football team which he and his teenage friends organized, which took on all comers. Rangy and light, he says he was no great shakes on defense but his pass-snagging did win a few games.

At U.C. he worked two years under the late Dr. Gilbert N. Lewis. A Ph.D. in 1939, he became an instructor. Six years later he was a full professor.

Dr. E. O. Lawrence's secretary was Helen Griggs (U.C. '39). On a rush train trip to California in 1942, Seaborg stopped off, married her in Pioche, Nevada. Their nearest to a honeymoon was an autumn week in 1942, spent in a town in Tennessee's Great Smokies, by strange coincidence right next to Knoxville and Oak Ridge. Now comfortably back to more leisurely life in their Albany home, Science shares time with five-month-old son Peter.

Seaborg asserts: "The average man is going to find it useful—almost necessary—to understand what an isotope is. The concept should be introduced early, in order that even youngsters understand something of the atom and how it is put together.

"This is the Atomic Age."

OAKLAND BOULEVARD #1946

New Element Isolated by U.C. Chemist

Americium, the synthetic element 95, has been isolated in a pure compound in a large enough quantity to study it on the ultra-microchemical scale, Dr. Glenn T. Seaborg, noted University of California nuclear chemist, reported for the first time here tonight.

Dr. Seaborg told the Rochester Section of the American Chemical Society, in the second annual Harrison Howe lecture, that details of its chemical properties have been learned by Dr. B. B. Cunningham, assistant professor of chemistry.

"This work of Cunningham's is a remarkable achievement in that the amounts available here were even smaller than those in the case of neptunium and plutonium," Dr. Seaborg said. "This is the third synthetic element which has been isolated in pure form."

Dr. Seaborg also revealed that curium 242, the heaviest isotope of any element so far reported, can be produced by neutron bombardment of Americium 241. This is a process similar to that which occurs in the chain reacting piles or atomic ovens.

The chemist also said that eventually curium may be purified in weighable amounts. Curium is the only one of the synthetic elements so far unpurified.

DAILY CAL.
Town Hall

11/19/46

Atomic Control To Be Discussed

"Problems of International Control of Atomic Energy" is the topic to be discussed at the Town Hall meeting Wednesday noon, in 11 Wheeler hall.

Isadore Perlman, associate professor of chemistry, will be the main speaker. After his talk, the discussion will be thrown open for audience questions and opinions.

Perlman worked with Glenn T. Seaborg, professor of chemistry, on the development of the atomic bomb.

The speaker will present several aspects of plans already prepared for international control of atomic energy, according to Nola Hansen '47, chairman of International Relations committee which sponsors the semi-monthly Town Hall meetings.

TOLEDO, O., BLADE
Circ. D. 168,462

NOV 19 1946

3rd New Synthetic Element Produced

By Science Service

ROCHESTER, N. Y., Nov. 19 —

A third of the synthetic, transuranic elements, americium, has been purified in sufficient quantities to permit a study of its chemical properties. Dr. Glenn T. Seaborg, University of California nuclear chemist and a leader in atomic bomb research, said today.

Dr. Seaborg said that the work on americium, element 95, which was done by Dr. B. B. Cunningham at the University of Chicago, was "a remarkable achievement in that the amounts available were even smaller than those in the case of neptunium and plutonium, the previously purified synthetic elements."

Curium is the only one of the synthetic elements not yet isolated in pure form, Dr. Seaborg pointed out, in a talk to the Rochester section of the American Chemical Society here last night.

NOV 10 1946

AMERICIUM AIDS NUCLEAR STUDY

New Milestone in Research Made by Discovery.

Rochester, N. Y., Nov. 19.—A new milestone in the revolutionary advance of nuclear chemistry has been reached with the isolation in pure form of americium, one of the four new elements discovered in the production of atomic energy, it was revealed here last night before the Rochester section of the American Chemical Society.

This achievement, which has made possible for the first time the study of americium, element 95, on an ultra-microchemical scale, was related by Prof. Glenn T. Seagrave of the University of California, co-discoverer of americium and plutonium.

Delivering the second annual Harrison Howe lecture, Seagrave also disclosed that an isotope, or variant form of curium, element 96, can be produced by neutron bombardment of americium. This isotope has been designated as curium 242 and is the heaviest isotope of any element so far reported.

Performed at Chicago.

The research leading to the isolation of americium and the determination of some of its chemical properties was performed at the metallurgical laboratory of the University of Chicago by Dr. B. B. Cunningham, now teaching chemistry at the University of California, Seagrave said.

One of the most important facts already learned about americium, the lecturer pointed out, is that it possesses even greater radioactivity than plutonium and is therefore a highly dangerous substance with which to work. Like neptunium and plutonium, which previously had been isolated, americium is a synthetic element, being produced from uranium, Seagrave added.

Anderson, S. C., Independent
Circ. D. 17,302 S. 17,849

NOV 10 1946

THE WORLD TODAY

New Element, Americium, Is Purified For Study

By SCIENCE SERVICE
Special To The Independent
ROCHESTER, N. Y., Nov. 18—A third of the synthetic, transuranic elements, americium, has been purified in sufficient quantities to permit a study of its chemical properties.

This was revealed here tonight for the first time by Dr. Glenn T. Seaborg, University of California nuclear chemist who was a leader in atomic bomb research.

DR. SEABORG said that the work on americium, element 95, which was done by Dr. B. B. Cunningham at the University of Chicago Metallurgical Laboratory, was "a remarkable achievement in that the amounts available were even smaller than those in the case of neptunium and plutonium, the previously purified synthetic elements.

The scientist also revealed that curium 242, the heaviest isotope of any element so far reported, can be produced by the same chain-reacting pile technique used for obtaining plutonium. Instead of bombarding uranium with neutrons, it would be necessary to bombard americium with neutrons.

CURIUM IS THE only one of the synthetic elements not yet isolated in pure form, Dr. Seaborg pointed out. He indicated, however, that this may be possible if and when such isotopes as curium 243, 244, 245 or 246 are produced. Such isotopes, Dr. Seaborg said, may have larger lifetimes than the brief span of the curium isotopes now known.

Dr. Seaborg delivered the second annual Harrison Howe lecture to the Rochester section of the American Chemical Society here tonight.

It is now almost certain, he continued, that the four transuranium elements, as they are called, do not exist in appreciable amounts on the face of the earth. However, he emphasized, it is possible that some transuranium isotope or isotopes, formed by a mechanism not yet conceived, may exist.

NOV 19, 1946
ST. LOUIS, MO. POST OFFICE

NEWLY DISCOVERED ELEMENT ISOLATED IN PURE FORM

ROCHESTER, N.Y., Nov. 19 (INS)—Prof. Glenn T. Seaborg of the University of California announced last night the isolation in pure form of americium "one of the four new elements discovered in the production of atomic energy. The other three are plutonium, neptunium and curium.

Seaborg, in an address to the Rochester section of the American Chemical Society, also disclosed that an isotope or variant form of Curium, element 96, the heaviest element so far reported, can be produced by neutron bombardment of americium.

Research leading to the isolation of americium was done at the University of Chicago by Dr. B. B. Cunningham, now assistant professor of chemistry at the University of California.

One of the facts already learned about americium, said Prof. Seaborg, is that it possesses greater radioactivity than plutonium and is therefore highly dangerous to work with. Like neptunium and plutonium, americium is a synthetic element produced from uranium, element 92.

NOV 1 1946

Americium, New Element, Isolated; Marks Milestone in Atomic Study

By a Natural Science Writer of The Christian Science Monitor

ROCHESTER, N. Y., Nov. 19—With the isolation in pure form of americium, one of the four new elements discovered in the production of atomic energy, a new milestone has been reached in the revolutionary advance of nuclear chemistry.

Prof. Glenn T. Seaborg, University of California researchist and codiscoverer of americium and plutonium, told the Rochester Section of the American Chemical Society that this achievement is remarkable because the amount of americium available is so small. It is even smaller than the infinitesimal quantities involved in isolating plutonium and neptunium, elements Nos. 94 to 93 respectively, he said. Nevertheless, it is sufficient to allow study of these materials for the first time on an ultramicrochemical scale.

Professor Seaborg also disclosed

that an isotope or variety of curium, element No. 96, the heaviest isotope of any element reported so far, can be made by bombarding americium with neutrons.

Although curium, of which Professor Seaborg was also co-discoverer, has not yet been isolated in weighing amounts, he indicated that curium isotopes with an atomic weight as high as 246 may be produced and eventually become available in pure form for chemical study. Americium possesses even greater radioactivity than plutonium, and is therefore a highly dangerous material with which to work.

Like neptunium and plutonium, which had previously been isolated, americium and curium are synthetic elements, produced from uranium, element 92.

BROOKLYN, N. Y., EAGLE
Circ. D. 103,121 Sat. 85,879 S. 104,828

NOV 19 1946

Scientists Isolate New Element, Americium

the University of Chicago Metallurgical Laboratory, was "a remarkable achievement" in that the amounts available were even smaller than those in the case of neptunium and plutonium, the previously purified synthetic elements.

The scientist also revealed that curium 242, the heaviest isotope of any element so far reported, can be produced by the same chain-reacting pile technique used for obtaining plutonium. Instead of bombarding uranium with neutrons, it would be necessary to bombard americium with neutrons.

Curium is the only one of the synthetic elements not yet isolated in pure form, Dr. Seaborg pointed

out. He indicated, however, that this may be possible if and when such isotopes as curium 243, 244, 245 or 246 are produced. Such isotopes, Dr. Seaborg said, may have longer lifetimes than the brief span of the curium isotopes now known.

Dr. Seaborg delivered the second annual Harrison Howe lecture to the Rochester section of the American Chemical Society last night.

By SCIENCE SERVICE

Rochester, N. Y., Nov. 19—A third of the synthetic, transuranic elements, americium, has been purified in sufficient quantities to permit a study of its chemical properties.

This was revealed here last night for the first time by Dr. Glenn T. Seaborg, University of California nuclear chemist who was a leader in atomic bomb research.

Dr. Seaborg said the work on americium, element 95, which was done by Dr. B. E. Cunningham at

NOV 18 1946

Americium Isolated In Pure Form

Professor Seaborg Reveals New Milestone In Nuclear Chemistry

Rochester, N. Y., Nov. 18.—(Special).—A new milestone in the revolutionary advance of nuclear chemistry has been reached with the isolation in pure form of americium, one of the four new elements discovered in the production of atomic energy. Professor Glenn T. Seaborg, of the University of California, co-discoverer of americium and plutonium, revealed tonight in an address to the Rochester Section of the American Chemical Society.

This achievement, which has made it possible to study americium, element 95, for the first time on the ultramicrochemical scale, is remarkable because the amount of the substance available was even smaller than the infinitesimal quantities used in isolating plutonium, element 94, and neptunium, element 93, declared Professor Seaborg, who presented the second annual Harrison Howe Lecture sponsored by the Rochester Section.

Professor Seaborg also disclosed that an isotope, or variant form, of curium, element 96, which is designated as curium 242 and is the heaviest isotope of any element so far reported, can be produced by neutron bombardment of americium. Although curium, of which Professor Seaborg also was co-discoverer, has not yet been isolated in weighable amounts, he indicated that curium isotopes with an atomic weight as high as 246 may be produced and may eventually become available in pure form for chemical investigation.

Research Done at UofC.

The research which led to the isolation of americium and the subsequent determination of some of its chemical properties was done at the Metallurgical Laboratory of the University of Chicago by Dr. B. B. Cunningham, now assistant professor of chemistry at the University of California, according to Professor Seaborg, who directed the Metallurgical Laboratory's wartime work on plutonium for the atomic bomb project.

Research Done at UofC.

The research which led to the isolation of americium and the subsequent determination of some of its chemical properties was done at the Metallurgical Laboratory of the University of Chicago by Dr. B. B. Cunningham, now assistant professor of chemistry at the University of California, according to Professor Seaborg, who directed the Metallurgical Laboratory's wartime work on plutonium for the atomic bomb project.

One of the facts already learned about americium is that it possesses even greater radioactivity than plutonium and is therefore a highly dangerous substance with which to work, Professor Seaborg reported, adding:

"Even if this element should become available in ordinary amounts, that is, let us say, milligram amounts, it will always be necessary to conduct its investigation with special precautions and using the special techniques for handling highly alpha-active material. The investigation of the chemical properties of americium will demand investigators who are well trained with handling highly alpha-active materials."

Like neptunium and plutonium, which had previously been isolated, americium is a synthetic element, since it is produced from uranium, element 92, Professor Seaborg said, noting that curium also is synthetic.

It is now almost certain, he continued, that the four transuranium elements, as they are called, do not exist in appreciable amounts on the face of the earth, although natural plutonium has been found in minute quantity. He emphasized, however, that it is possible that some transuranium isotope or isotopes, formed by a mechanism as yet not conceived, may exist. Further searches for such elements might be worth while, he declared.

Of the four transuranium elements so far reported, Professor Seaborg said, the one which offers the greatest hope of providing the base material for developing an atomic energy industry is plutonium, which also has

CALLS AMERICIUM NUCLEAR MILESTONE

N. Y. TIMES
Special to THE NEW YORK TIMES

ROCHESTER, N. Y., Nov. 18.—Isolation in pure form of americium, one of the four new elements discovered in the production of atomic energy, marks a new milestone in the revolutionary advance of nuclear chemistry, according to Prof. Glenn T. Seaborg of the University of California. He was a co-discoverer of americium and plutonium and spoke tonight before the Rochester Section of the American Chemistry Society.

In presenting the second annual Howe Lecture, sponsored by the section, Professor Seaborg termed the achievement remarkable because, in making it possible to study americium, element 95, for the first time on the ultra-microchemical scale, the amount of the substance available was even smaller than the infinitesimal quantities used in isolating plutonium, element 94, and neptunium, element 93.

"Of the four trans-uranium elements so far reported," Professor Seaborg said, "the one which offers the greatest hope of providing the base material for developing an atomic energy industry is plutonium, which also has been found highly successful as the explosive ingredient of the atomic bomb."

been found highly successful as the explosive ingredient of the atomic bomb. Moreover, he pointed out, plutonium is the only transuranium element for which methods have been developed for production in relatively large amounts.

Plutonium's high radioactivity makes it expedient, however, to use only very small amounts for scientific study, so that it appears to be "outside the class of elements which might eventually find widespread distribution among chemists for investigation of its chemical properties," he said.

Much more likely to be used for study in the future, according to Professor Seaborg, is neptunium, since one of its isotopes, neptunium 237 has relatively low radioactivity and therefore is "relatively safe to handle from the health standpoint."

Professor Seaborg recently revealed that neptunium 237 is fissionable, like plutonium and uranium, but said fission occurs too infrequently to use the isotope in an atomic bomb.

NOV 19 1946

Americium, New Element, Isolated Marks Milestone in Atomic Study

By a Natural Science Writer of The Christian Science Monitor

ROCHESTER, N. Y., Nov. 19.—
With the isolation in pure form
of americium, one of the four new
elements discovered in the pro-

duction of atomic energy, a new
milestone has been reached in the
revolutionary advance of nuclear
chemistry.

Atomic Research

DAILY CALIFORNIAN
11 20 46

Chemist Isolates Americium For Laboratory Experiment

By Jack Bik '49

Americium, the synthetic element 95, has been isolated in large enough quantity so that it can be studied on the ultramicrochemical scale. Glenn T. Seaborg, professor of chemistry, reported Monday in the second annual Harrison Howe lecture, given before the Rochester, N. Y., section of the American Chemical society.

The work which Seaborg described was done by Burris B. Cunningham, assistant professor of chemistry and Seaborg's assistant in the Radiation Laboratory.

"This work of Cunningham's is a remarkable achievement in that the amounts of americium available here were even smaller than those of neptunium and plutonium," Seaborg said. "This is the third synthetic element which has been isolated in pure form."

(A synthetic element is an element which does not occur in nature.)

Seaborg also revealed that curium 242, the heaviest isotope of an element so far reported, can be produced by neutron bombardment of americium 241. This is a process similar to that which occurs in the chain reacting piles or atomic ovens.

Science Isolates New Element

N. Y. WORLD-TELEGRAM
By Science Service.

ROCHESTER, Nov. 19.—A third of the synthetic, transuranic elements, americium, has been purified in sufficient quantities to permit a study of its chemical properties.

This was revealed here last night for the first time by Dr. Glenn T. Seaborg, University of California nuclear chemist who was a leader in atomic bomb research. He addressed the Rochester section of the American Chemical Society.

Dr. Seaborg said the work on americium, element 95, which was done by Dr. B. B. Cunningham at the University of Chicago Metallurgical Laboratory, was "a remarkable achievement in that the amounts available were even smaller than those in the case of neptunium and plutonium, the previously purified synthetic elements.

The scientists also revealed that curium 242, the heaviest isotope of any element so far reported, can be produced by the same chain-reacting pile technique used for obtaining plutonium. Instead of

bombarding uranium with neutrons, it would be necessary to bombard americium with neutrons.

Curium is the only one of the synthetic elements not yet isolated in pure form, Dr. Seaborg pointed out. He indicated, however, that this may be possible if and when such isotopes as curium 243, 244, 245 or 246 are produced. Such isotopes, Dr. Seaborg said, may have longer lifetimes than the brief span of the curium isotopes now known.

Prof. Glenn T. Seaborg, University of California researchist and codiscoverer of americium and plutonium, told the Rochester Section of the American Chemical Society that this achievement is remarkable because the amount of americium available is so small. It is even smaller than the infinitesimal quantities involved in isolating plutonium and neptunium, elements Nos. 94 to 93 respectively, he said. Nevertheless, it is sufficient to allow study of these materials for the first time on an ultramicrochemical scale.

Professor Seaborg also disclosed that an isotope or variety of curium, element No. 96, the heaviest isotope of any element reported so far, can be made by bombarding americium with neutrons.

Although curium, of which Professor Seaborg was also co-discoverer, has not yet been isolated in weighing amounts, he indicated that curium isotopes with an atomic weight as high as 246 may be produced and eventually become available in pure form for chemical study. Americium possesses even greater radioactivity than plutonium, and is therefore a highly dangerous material with which to work.

Like neptunium and plutonium, which had previously been isolated, americium and curium are synthetic elements, produced from uranium, element 92.

To the Editors: FORTUNE

FALL, 1946
In your article "University of California," I think you have marshaled interesting material and have presented it very attractively. There is a statement of fact, however, which should be qualified. In listing scientific discoveries made at the University of California, you include a reference to element 96. It is my understanding that work on element 96 was carried out under the direction of Glen T. Seaborg by the scientists of the Metallurgical Project here at the University of Chicago.

ROBERT M. HUTCHINS, Chancellor
University of Chicago, Chicago, Illinois

Dr. Seaborg was loaned by the University of California to the Metallurgical Laboratory at the University of Chicago for work on the Manhattan Project. It was while he was engaged in this pursuit that he discovered elements 95 and 96. THE EDITORS

NOV 21 1946

Make Element That Splits Like Uranium

Hasn't Potency of That Used for Warfare.

BERKELEY, CALIF. — Atomic ovens can produce another chemical element which splits like uranium 235 and plutonium, Dr. Glenn T. Seaborg, nuclear research authority, disclosed.

The recently discovered substance is neptunium 237, an isotope or chemical twin of neptunium 239, the element which automatically changes into the plutonium used in atom bombs.

Dr. Seaborg, a University of California chemist, made his report in a paper prepared for delivery at a sectional meeting of American Chemical society.

Although neptunium 237, when bombarded with slow neutrons, undergoes fission as does U-235 and plutonium 239, the number of atoms which will split in any given quantity of the chemical is so low that it could not be used in atomic bombs, Seaborg said.

He made no reference to the amount of energy released in the fission of neptunium 237. U-235 and plutonium atoms release energies of about 200 million volts, which gives them their destructive power.

However, he termed the new fission discovery "very interesting" from the scientific standpoint and said that 100 milligrams, about one three-hundredth of an ounce, had been made for special chemical studies.

The first neptunium 237 was produced more than a year ago in the university's 225-inch cyclotron by Dr. Seaborg and Arthur C. Wahl. Seaborg said it now is a byproduct of plutonium production at Clinton, Tenn., and Hanford, Wash.

Dr. Seaborg also reported discovery of a new isotope of plutonium with an atomic weight of 241. Up to now only one form of the substance, the powerful U-239, has been revealed publicly.

Seaborg did not report any details of plutonium 241 except to say that it was produced by bombarding the most common type of uranium, U-238, with alpha particles.

"They are the heaviest atom-smashing projectiles ordinarily used by the cyclotron."

11/21/46

ERIE, PA., TIMES
Circ. D. 47,636

NOV 21 1946

FIND NEW ELEMENT IN ISOLATED FORM

Rochester, N. Y., Nov. 21.—(NS) Prof. Glenn T. Seaborg of the University of California announced the isolation in pure form of "Americium," one of the four new elements discovered in the production of atomic energy. The other three are plutonium, neptunium and curium.

Prof. Seaborg, in an address to the Rochester section of the American Chemical Society, called the isolation of Americium a new milestone in the revolutionary advance of nuclear chemistry which makes it possible for the first time to study the element carefully.

11/26/46

BERKELEY GAZETTE

Mother Nature Gets Blame for All This Atom Fissure Stuff

The first atomic oven on earth was operated by Mother Nature, and it still works incessantly to produce plutonium and other transuranic elements.

This was a conclusion today of Dr. Glenn T. Seaborg professor of chemistry on the Berkeley campus of the University of California and a leader in atomic bomb research.

Dr. Seaborg pointed out that spontaneous fission occurring in uranium in the earth releases neutrons which transmute uranium-238 into plutonium and other synthetic elements.

However, he added, these elements are not produced in sufficient quantity for any practical purposes. Plutonium, for example, was found to be present in pitchblende and carnotite, two uranium-bearing ores, in the percentage of one part in one million. Others probably exist in smaller quantities, he added.

U.C. Scientist to Advise N.Y. Nuclear Project

Plans for the establishment of a \$20,000,000 nuclear research laboratory near Schenectady, N.Y., for the study of power generation by atomic energy—a project whose program will utilize the consultant services of University of California scientists—was announced yesterday by the War Department.

"Named the Knolls Atomic Power Laboratory, this will be the fourth in the network of national laboratories established by the Manhattan Project to further nuclear research," said Maj. Gen. L. R. Groves, Manhattan project chief.

"The work on this program began many months ago, and will be transferred to the atomic energy commission as a part of the broad peacetime development program."

G-E OPERATION

General Groves said the General Electric Company, under a contract made several months ago, will operate the new nuclear research center. The company is serving as prime contractor for design and construction.

"Research work in all phases of atomic power development will be carried on in the new Knolls Atomic Laboratory," General Groves reported. "In addition, research on specific problems in connection with the operation of the Hanford Engineer Works, operated by General Electric's Chemical Department, will be carried out in the new facility."

OPERATION PERSONNEL

Land for the Knolls Atomic Power Laboratory will be provided by the General Electric Company adjoining the site of the huge new General Electric Research Laboratory, now under construction, where the company's fundamental research in other fields will be concentrated,

according to the War Department announcement.

The announcement said Dr. C. G. Suits, vice-president and director of research for the company, will have general supervision of the nuclear study program. Responsibility for the atomic power pile project, which will be the principal activity of the new Government-sponsored laboratory, has been assigned to Dr. Kenneth H. Kingdon, senior G-E physicist, who worked at Berkeley with Dr. Ernest O. Lawrence, director of the University of California radiation laboratory, in the development of the electromagnetic plant for separation of uranium 235.

"Basic nuclear reactions and the theory of uranium fission are in the field of physics," Dr. Kingdon said, "but the detailed study of the problems of construction of an atomic power reactor for power production involves major contributions from chemistry, chemical engineering, metallurgy and electrical and mechanical engineering.

"For this reason, scientists specializing in these fields will compose a considerable proportion of the group working on the new program."

CONSULTANTS NAMED

Doctor Suits announced that a number of scientists who played important roles in the earlier work of the Manhattan Project have been retained by General Electric as consultants for the new work. They include Doctor Lawrence and Dr. Glenn Seaborg, both of the University of California; Dr. Hans A. Bethe of Cornell University, and Dr. Warren K. Lewis of the Massachusetts Institute of Technology.

"In addition to chemical, physical, metallurgical and chemical engi-

neering laboratories," the War Department said, "special facilities are planned in the new atomic power laboratory. Among these are an uranium reactor for the production of atomic power, powerful atom smashers, and a 'hot' chemistry laboratory, where the reactions involving radiation from radioactive materials may be studied."

NY TIMES 12/1/46
AMERICIUM ISOLATED

Americium, element 95, which, like neptunium (element 93) and plutonium (element 94), has been artificially created out of uranium by modern alchemy, has been isolated in pure form to permit study of its chemical properties, it was announced at a meeting of the American Chemical Society by Prof. Glenn T. Seaborg of the University of California, one of the co-discoverers of plutonium, as well as of americium and also of curium (element 96).

The purification was done at the Manhattan District's Metallurgical Laboratory at the University of Chicago by Dr. E. B. Cunningham and was described by Dr. Seaborg as "a remarkable achievement in that the amounts available were even smaller than those in the case of neptunium and plutonium." Dr. Seaborg also revealed that curium of atomic weight 242, the heaviest isotope of any element so far reported, can be produced by bombarding americium with neutrons. Curium, because of its brief lifetime, is the only one of the synthetic elements not yet isolated in pure form. This may be possible, he stated, if and when such isotopes as curium 243, 244, 245 or 246 are produced, as such isotopes may have longer lifetimes.

Atom Bomb Foretold In Report 5 Years Ago

12/10/46

BERKELEY, Dec. 10.—Nearly 67 months ago, four University of California scientists submitted to the Physical Review, a scientific magazine for American physicists, a paper that presented in unemotional, matter-of-fact language a preview of the atomic age.

Today, that paper saw light for the first time.

Submitted May 29, 1941, it began with the words:

"We would like to report that we have observed the fission of 94 (239) with slow neutrons..."

It was signed by Glenn T. Seaborg, A. C. Wahl, J. W. Kennedy and Emilio Segre, two of whom—Seaborg and Segre—are still on the University of California's atomic experiment staff.

KEPT SECRET

But when the paper reached the office of the Physical Review, it was quickly suppressed. The editors did not doubt the veracity of the four eminent scientists' report, but the United States, although still at peace, was in the race for development of atomic power.

So the report was turned over to Dr. Ernest O. Lawrence, the U. C.

expert who built the first cyclotron, and by him it was in turn transmitted to the National Academy of Sciences Committee on Atomic Fission—the group of top scientists directed by President Roosevelt to unlock the power of the atom.

MEMO TO REPORT

To the report, Lawrence attached a memorandum in which he predicted:

1. That uranium 238 could be turned into plutonium (239) by processes earlier discovered at Berkeley, "increasing about 100-fold the total atomic energy available."

2. That plutonium could be used to make atomic power plants weighing as little as 100 pounds.

3. That this in turn would make possible what "might be described as a 'super bomb.'"

The rest of the story is history—the "super bomb" brought a quick end to Japan's war making and plunged the nations of the world into a still-fearful tug of war over control of atomic energy.

But the report that started it all, the simple story of a great discovery by the four scientists, lay hidden until today in the secret files of the Manhattan Project. Today, a portion of the report was released at University of California. Its remainder is still secret.

OAKLAND POST-ENQUIRER

12/10/46



DR. GLENN T. SEABORG

DR. EMILIO SEGRE

They Had Preview of Atomic Age

—Post-Enquirer photo.



SCIENTISTS— Drs. Glenn T. Seaborg, left, and Emilio Segre are shown at a radioactivity counter—so called because it “counts” the invisible explosions of the atom.

—Photo by San Francisco Examiner.

U. C. ATOM LAB LIFTS SECRECY ON WAR WORK

S.F. EXAMINER 12/10/46
Reports Show Plutonium Known
As Bomb Basis 5 Years Ago

By **DICK PEARCE**

The guardians of the Nation's atomic bomb secrets have finally released a fateful paper composed at Berkeley on a spring day more than five years ago.

Written for the eyes of scientists, the papers starts out in this prosaic fashion:

“We would like to report that that we have observed the fission of 94 (239) with slow neutrons...”

Thus was announced the beginning of a chain of discoveries that ended militarily when the plutonium bomb descended upon Nagasaki.

FOUR AUTHORS—

The paper was written by four atomic scientists at the University of California—J. W. Kennedy, Glenn T. Seaborg, Emilio Segre and A. C. Wahl.

It disclosed that plutonium was fissionable with slow as well as fast neutrons and should make an even better atomic bomb than uranium.

It was received on May 29, 1941, in the offices of the Physical Review, which is the journal of American physicists. But it was not printed.

For the secret race to harness atomic energy had begun, even though the United States was still at peace. And this paper packed a punch that was to help knock out a nation.

GROUP AT WORK—

Instead it was rerouted by Dr. E. O. Lawrence, the university's famed physicist, to the National Academy of Sciences Committee on Atomic Fission. This was the group of top scientists, including Lawrence, working at the late President Roosevelt's order to unlock the power of the atom.

Cont'd.

Along with the paper of his four Berkeley colleagues Lawrence sent a remarkable memorandum.

He said the discovery of the four scientists opened the way to these three great possibilities:

1—That inert, worthless uranium 238 could be turned into plutonium by processes earlier discovered at Berkeley, "thus increasing about one hundred fold the total atomic energy obtainable" in the Nation's great race for such energy.

2—That plutonium could be used to make atomic power plants weighing perhaps a hundred pounds instead of a hundred tons as would be required with ordinary uranium.

3—That plutonium could be used to produce what he said "might be described as a 'super bomb.'"

His first prediction led to the now historic uranium oven or "pile" erected under the University of Chicago Stadium and later to the huge Hanford, Wash., plutonium works.

PEACE PURPOSE—

His second prediction is today unrealized. It is the thing toward which scientists are bending their efforts now—an atomic power plant for industrial purposes.

His third prediction came true at Nagasaki.

Two of the four scientists still are at Berkeley—tall, lanky Glenn Seaborg, professor of chemistry and co-discoverer of plutonium, and Emilio Segre, Italian-born associate of famed Enrico Fermi and discoverer of element 43.

Seaborg recalled yesterday that they set to work on plutonium fission about January 1, 1941, using the sixty-inch cyclotron to bombard ordinary uranium with neutrons and produce neptunium, which decayed by radioactivity into plutonium.

USE CYCLOTRON—

The total plutonium obtained was about one microgram, or one-millionth of a gram, an amount almost invisible to the naked eye.

This was then bombarded in the thirty-seven-inch cyclotron with neutrons to produce fission.

At the end of three months they had discovered not only that plutonium was fissionable with slow neutrons, but that its efficiency was higher than uranium 235.

All of the complicated details

of their experiments were put into the paper they sent to the Physical Review and then voluntarily withheld for the sake of the Nation's safety.

Now, more than five years later, the paper has at last been published—but with certain details cut out.

They are details which, in this new era of uneasy peace, are still vital to the Nation's security.

Control of the Atom S.F. CHRONICLE 12/13/46

TRUMAN APPOINTS NINE SCIENTISTS AND ENGINEERS TO THE ADVISORY COMMITTEE

WASHINGTON, Dec. 12 (AP)—President Truman completed the tasks assigned him under the new Atomic Energy Act today by appointing nine prominent scientists and engineers as a general advisory committee for the control commission.

While this was the last step the President himself had to take to put the setup into operation, the commission headed by David E. Lilienthal still must appoint its general manager and a number of other groups.

The law empowers the commission to name advisory boards to assist it on "legislation, policies, administration, research and other matters." Mr. Truman's statement said the commission had advised him it plans committees on biology and medicine, geology and mining, and the social sciences, among others.

The general advisory committee which the President named is required by the act "to advise the commission on scientific and technical matters relating to materials, production, and research and development."

The members will select their own chairman. They get \$50 a day and expenses and serve for six years, except that the original appointments are for staggered terms of two, four and six years.

The members are:

JAMES B. CONANT, president of Harvard and a leading figure in atomic energy.

LEE A. Du BRIDGE, president of California Institute of Technology, a physicist not previously connected with atomic energy.

ENRICO FERMI, Nobel prize win-

ner in physics and a leading scientist in the work on nuclear chain reaction.

J. R. OPPENHEIMER, University of California physicist and wartime director of the Los Alamos, N. M., laboratories.

I. I. RABI, Columbia University physicist, Nobel prize winner and leading consultant on atomic energy.

HARTLEY ROWE, vice president and chief engineer of the United Fruit Company and engineering advisory for the Manhattan project.

GLENN T. SEABORG, University of California chemist who participated in the discovery of plutonium.

CYRIL STANLEY SMITH, director of the University of Chicago Institute of Metals who was in charge of wartime metallurgical work at Los Alamos.

HOOD WORTHINGTON, chemical engineer of E. I. DuPont de Nemours and Company, an authority on design and operation of nuclear reactors.

Chemist of the Year CHEM. AND ENG. NEWS
12/5/47

Winner of C&EN's informal poll on "The Chemist of the Year" is Glenn T. Seaborg, whose picture appeared on the Dec. 10 cover. Others who received votes were: Roger Adams, Marston Bogert, E. J. Cohn, Carl Cori, Farrington Daniels, Bradley Dewey, Willard Dow, Vincent du Vigneaud, Alden H. Emery, Fred Koch, W. A. Noyes, C. L. Parsons, Linus Pauling, C. C. Price, H. C. Urey, C. A. Thomas, and Willis Whitney.

Only six individuals were nominated whose pictures have not appeared on 1946 covers—Cohn, Daniels, du Vigneaud, Noyes, Thomas, and Urey. The subject of the Jan. 6, 1947, cover is Noyes, who becomes ACS President on New Year's Day. That nuclear fission is the number one subject in the minds of most readers was clearly demonstrated in remarks which accompanied many votes. For example, one voter stated: "The man of the year should certainly be a nuclear energy worker"; another writes: "My vote goes to Glenn T. Seaborg because, in honoring him, you honor all the thousands of chemists who played a part in the release of atomic energy."

The original plan adopted by the editors was to reserve the Dec. 25 cover for the man or women selected by the readers, but in view of the fact that Glenn T. Seaborg appeared on the Dec. 10 cover, we have gone somewhat afield from chemistry (but we hope not too far!) in picking a well-known and greatly beloved gentleman—Santa Claus.

Frankly, this is the editors' way of wishing each and every reader of this publication a very merry Christmas and a happy and prosperous New Year—a year of peace, a year of spiritual and material progress, a year of mutual understanding within the ranks of the SOCIETY and in national and international matters that mean so much to the future of the world.

May we take this opportunity to thank all those who have in any way contributed to the advancement of your publications during the year now drawing to an end, authors, reviewers, contributing editors, local section and divisional officers, symposia committee members, advisory board members, and readers who have given us the benefit of their constructive suggestions and criticisms.

In turn we ask of our readers continued loyal support as we advance to a weekly basis of issuance for C&EN, beginning with the Jan. 6 number. The still critical situation on paper, delays in the delivery of greatly needed printing equipment, the continued slowness of the post office are some of the problems still with us and are likely to be so for some time to come. We ask your indulgence in the transition period.

CHEM. AND ENG. NEWS 12/5/47

Western Reserve Lectures

The sixth annual Frontiers in Chemistry lectures at Western Reserve University will be held February through May. The series will be divided into two sections, the first on Recent Advances in Physical and Inorganic Chemistry, and the second on Modern Theories of Organic Chemistry. The subjects, lectures, and dates are:

- Feb. 28. Theory of Reaction Rates. FARRINGTON DANIELS
- March 7. Distillation Theory and Practice. E. R. GILLIAND
- March 14. High Vacuum Distillation. K. C. D. HICKMAN
- March 21. Transuranium Elements. G. T. SEABORG
- March 28. Chemistry of Deuterium. H. C. UREY
- April 11. Artificial Radioactivity. PHILIP MORRISON
- April 18. The Chemical Bond and Resonance. G. W. WHELAND
- April 25. Electrochemical Theory of Organic Reactions. JOHN R. JOHNSON
- May 2. Free Radical Mechanisms. FRANK R. MAYO
- May 9. Carbonium Ion Mechanisms. C. C. PRICE
- May 16. Reaction Rates and Mechanisms. LOUIS P. HAMMETT
- May 23. Bond Distances and Molecular Structure. L. O. BROCKWAY

Science
The Atomic Energy Commission announced on 11 December that it would assume formal control of the Manhattan Engineer District soon after 1 January. Since the Commission was appointed on 28 October (See *Science* 8 November and 13 December) it has had a series of conferences with members of the War Department preparatory to taking active control of a plant valued at \$1,400,000,000 with approximately 43,000 employees.

To aid the Commission President Truman appointed a nine-man General Advisory Committee specifically authorized to consult with the Commission on "scientific and technical matters relating to materials, production and research, and development" on 12 December. The new Committee is made up of James B. Conant, president of Harvard; Lee A. DuBridge, president, California Institute of Technology; Enrico Fermi, professor of physics, University of Chicago; I. I. Rabi, professor of physics, Columbia University; J. R. Oppenheimer, formerly director of the Los Alamos Laboratories of the Manhattan Project, and now professor of theoretical physics, University of California; Glenn T. Seaborg, professor of chemistry, University of California; C. S. Smith, director of the Institute of Metals, University of Chicago; Hartley Rowe, vice-president and chief engineer of The United Fruit Company; and Hood Worthington, chemical engineer, E. I. du Pont de Nemours & Co.

BERKELEY DAILY GAZETTE

BERKELEY, CALIFORNIA, SATURDAY EVENING, DECEMBER 28, 1946

Advisory Job Given To Seaborg

Prof. Glenn T. Seaborg of the University of California, Berkeley, one of the world's leading atomic scientists, has been elected a councilor-at-large of the American Chemical Society. He will serve for three years on the council, the society's advisory body on policy and general management, it was disclosed today.

Co-discoverer of plutonium, used in making atomic bombs, and also of americium and curium, elements 95 and 96, Prof. Seaborg is a member of the nine-man general advisory committee recently appointed by President Truman to assist the Atomic Energy Commission headed by David E. Lilienthal.

Born at Ispheming, Mich., in 1912, Prof. Seaborg received the bachelor of arts degree from the University of California in 1934 and the doctor of philosophy degree in 1937. After serving as an assistant in chemistry for two years, he became an instructor in 1939, an assistant professor in 1941, and later a full professor.

DIRECTED RESEARCH

During the war, on a leave of absence from California, he directed chemical research on plutonium and other heavy elements for the atomic bomb project at the University of Chicago Metallurgical Laboratory. In recognition of his achievements in nuclear chemistry, he received the 1945 Distinguished Service Award of the Chicago Junior Association of Commerce, and this year he was chosen Harrison Howe lecturer by the Rochester section of the American Chemical Society.

Another Californian, Walter A. Schmidt, president and general manager of Western Precipitation Co., Los Angeles, has been re-elected a director-at-large of the society for a four-year term, according to the announcement.

NEW YORK, N. Y.
HERALD TRIBUNE

DEC 28 1946

Chemical Society Elects

The following leaders in chemistry and chemical engineering have been elected councilors-at-large for three years of the American Chemical Society: Dr. Cecil L. Brown, director of the Esso Laboratories, Baton Rouge; Dr. M. L. Crossley, research director of American Cyanamid, Bound Brook, N. J.; Professor Glenn T. Seaborg, of the University of California, and Professor Roger J. Williams, director of the Biochemical Institute at the University of Texas.

DEC 29 1946

Chemists Honor Atomic Expert

BERKELEY, Dec. 28.—The American Chemical Society has honored Prof. Glenn T. Seaborg of the University of California with an appointment as councilor-at-large.

The announcement received here today from New York named Professor Seaborg as "one of the world's leading atomic scientists" and declared he will serve for three years on the society's advisory body on policy and general management.

Professor Seaborg was a co-discoverer of plutonium, used in making atomic bombs, also of americium and curium, elements 95 and 96. He is a member of the nine-man General Advisory Committee recently appointed by President Truman to assist the Atomic Energy Commission headed by David E. Lilienthal.

The 34-year-old professor directed chemical research on plutonium and other heavy elements at the University of Chicago Metallurgical Laboratory during the war. In recognition of his achievements in nuclear chemistry, he received the 1945 Distinguished Service Award of the Chicago Junior Association of Commerce, and this year was chosen Harrison Howe lecturer by the Rochester section of the American Chemical Society.

Professor Seaborg received his AB degree from the University of California in 1934 and his Ph.D. in 1937. He became an instructor in chemistry in 1939, an assistant professor in 1941 and later a full professor.



Prof. Glenn T. Seaborg, atomic scientist, who will help guide the American Chemical Society.

DEC 30 1946

Chemists Elect Glenn T. Seaborg

Glenn T. Seaborg, University of California professor, and one of the world's leading atomic scientists, has been elected a councillor-at-large of the American Chemical Society.

He will serve for three years on the council, the society's advisory body on policy and general management.

Professor Seaborg is the co-discoverer of plutonium, used in making atom bombs, and also of americium and curium. He graduated from the University of California in 1934, and took his doctor of philosophy degree there in 1937.

Seaborg Named ^{CHRCV-1022} To Scientific Post ¹²⁻³⁰

Election of Glenn T. Seaborg, University of California scientist, as a Councillor-at-Large of the American Chemical Society was announced yesterday. He will serve for three years.

Professor Seaborg is co-discoverer of plutonium used in making atomic bombs, and recently was appointed a member of the advisory committee to the Atomic Energy Commission.

Since 1939 he has been an instructor at the university.

DEC 31 1946

Seaborg Named 'Chemist of Year'

Dr. Glenn T. Seaborg of the University of California, co-discoverer of plutonium, has been named "Chemist of the Year" in a national poll of chemists and chemical engineers, the American Chemical Society announced yesterday.

12/31/46

DEC 31 1946

JOUR

Chemist of the Year



Professor Glenn T. Seaborg of the University of California and co-discoverer of plutonium man-made source of atomic energy, who has been chosen "Chemist of the Year" in a nation-wide poll of chemists and chemical engineers conducted by the American Chemical Society. Thirty-four years old, he directed wartime chemical research on plutonium and other heavy elements for the atomic bomb project at the University of Chicago Metallurgical Laboratory.

New York Times

DEC 31 1946

California Man Is Voted
'Chemist of the Year'



Prof. Glenn T. Seaborg

A national poll of chemists and chemical engineers, conducted by Chemical and Engineering News, publication of the American Chemical Society, has resulted in the selection of Prof. Glenn T. Seaborg of the University of California as "chemist of the year," it was announced yesterday. He is co-discoverer of plutonium, man-made source of atomic energy.

He also is co-discoverer of americium and curium, elements 95 and 96. In the war he directed chemical research on plutonium and other heavy elements at the University of Chicago Metallurgical Laboratory. He is a member of the nine-man general advisory committee appointed by President Truman to assist the United States Atomic Energy Commission.

Professor Seaborg, who is 34 years old, was recently elected a councilor-at-large of the chemical society.

BERKELEY, CALIF. 11/8/47

Chemists Poll Fetes Seaborg

Prof. Glenn T. Seaborg of the University of California, co-discoverer of plutonium, man-made source of atomic energy, has been chosen "Chemist of the Year" in a nation-wide poll of chemists and chemical engineers conducted by "Chemical and Engineering News," publication of the American Chemical Society.

Prof. Seaborg, 34 years old, also was co-discoverer of americium and curium, elements 95 and 96. He is a member of the nine-man general advisory committee appointed by President Truman to assist the United States Atomic Energy Commission. During the war he directed chemical research on plutonium and other heavy elements at the University of Chicago Metallurgical Laboratory.

PITTSFIELD, MASS.
BERKSHIRE EAGLE

JAN 1 - 1947

Prof. Seaborg Chemist of Year

NEW YORK—A national poll of chemists and chemical engineers, conducted by Chemical and Engineering News, publication of the American Chemical Society, has resulted in the selection of Professor Glenn T. Seaborg of the University of California as "chemist of the year." it was announced yesterday. He is co-discoverer of the plutonium, man-made source of atomic energy.

He also is co-discoverer of americium and curium, Elements 95 and 96. In the war he directed chemical research on plutonium and other heavy elements at the University of Chicago Metallurgical Laboratory. He is a member of the nine-man general advisory committee appointed by President Truman to assist the United States Atomic Energy Commission.

Professor Seaborg, who is 34 years old, was recently elected a councilor-at-large of the chemical society.

WASH. STAR

FEB. 11, 1947

SEABORG SELECTED "CHEMIST OF YEAR"



Prof. Glenn T. Seaborg, noted University of California nuclear chemist, has been named "Chemist of the Year" in a nation-wide poll of chemists and chemical engineers conducted by *Chemical and Engineering News*, publication of the American Chemical Society.

Professor Seaborg, 34, is co-discoverer of plutonium, the atomic energy substance in the atomic bomb, and of the new trans-uranic elements, americium and curium. He directed chemical research on plutonium and other heavy elements in the Chicago portion of the atomic bomb project. Recently he was named by President Truman to the nine-man advisory committee to the U. S. Atomic Energy Commission.

Professor Seaborg spoke to our section in October on Plutonium and Nuclear Energy.

CHI. SUN 1/5/47

Atom Advisers Elect Californian

Oppenheimer Heads Group of Scientists

WASHINGTON, Jan. 4.—(AP)—J. R. Oppenheimer of the University of California today was elected chairman of the general advisory committee of scientists for the atomic energy commission.

Oppenheimer, 42, a physicist, was among the top-ranking researchers who developed and then constructed the atomic bomb. He was wartime director of the Los Alamos (N.M.) laboratory, where the first detonating test was made.

The atomic energy law requires a minimum of four meetings of the advisory committee a year.

In addition to Oppenheimer the committee includes: James B. Conant, president of Harvard; Prof. Enrico Fermi of the University of Chicago; Lee A. Du Bridge, president of the California Institute of Technology; Hartley Rowe, vice-president and chief engineer of the United Fruit Co.; Glenn T. Seaborg, professor of chemistry at the University of California; Cyril Stanley Smith, director of the Institute of Metals, University of Chicago, and Hood Worthington, chemical engineer of the Du Pont Co.



J. R. Oppenheimer.

WASH. D.C. EVENING STAR

Oppenheimer Elected Chairman of Advisory Atomic Energy Group

J. R. Oppenheimer, wartime director of the Los Alamos (N. Mex.) atom bomb laboratory, today was elected chairman of the General Advisory Committee of the United States Atomic Energy Commission.

A professor of physics at the University of California, 42-year-old Dr. Oppenheimer was a member of the Board of Consultants, the Secretary of State's Committee on Atomic Energy, which prepared the 'Acheson-Lilienthal' report on international control of atomic energy.

Today's closed session at the new War Department Building was the Advisory Committee's second. The first was held yesterday. The nine-man group, established by the Atomic Energy Act, is required to meet a minimum of four times a year, but will meet more frequently than that, the new chairman said.

The most important assignment given to the committee is to help find a director of research to head one of the four main operating divisions of the commission which took over the Nation's atomic energy facilities on New Year Day.

Other members of the advisory committee are Lee A. Du Bridge, president of the California Institute of Technology; President James B. Conant of Harvard University; Enrico Fermi, professor of physics,

University of Chicago; I. I. Rabi, professor of physics, Columbia University; Hartley Rowe, vice president and chief engineer, United Fruit Co.; Glenn T. Seaborg, professor of chemistry, University of California; Cyril Stanley Smith, director, Institute of Metals, University of Chicago, and Hood Worthington, chemical engineer, E. I. du Pont de Nemours Co.

The commission yesterday named as consultants three outstanding specialists in the field of industrial relations.

They are Chairman Lloyd K. Garrison of the War Labor Board; David A. Morse, Assistant Secretary of Labor, and Dr. George H. Taylor, professor of industrial relations at Wharton School of Finance and Commerce, University of Pennsylvania, a former chairman of the War Labor Board.

J. R. Oppenheimer Elected Chairman Of Atomic Group

WASHINGTON, Jan. 4 (AP)—J. R. Oppenheimer of the University of California today was elected chairman of the general advisory committee of scientists for the Atomic Energy Commission.

Oppenheimer, a 42-year-old physicist, was among the top ranking researchers who developed and then constructed the atomic bombs. He was wartime director of the Los Alamos, N. M., laboratory.

In addition to Oppenheimer the committee includes: President James B. Conant of Harvard; Professor Enrico Fermi of the University of Chicago; President Lee A. DuBridge of the California Institute of Technology; Hartley Rowe, vice president and chief engineer of the United Fruit Company; Glenn T. Seaborg, professor of chemistry of the University of California; Cyril Stanley Smith, director of the Institute of Metals, University of Chicago, and Hood Worthington, chemical engineer of the duPont Company.

University Research Aids 1946 Science Advances

By Walter Slesson '49

University science research has played an important part in five of the ten top science advances of 1946 which were listed by Science service.

First operation of the supercyclotron and prediction of the Oct. 9 meteor shower were largely University products, medical research with radioactive isotopes has been pioneered here, important research in biological warfare was undertaken on campus and University scientists have played prominent roles in the establishment of the Atomic Energy commission—all rated among the ten top science stories of the year.

Besides the completion of the giant 184-inch supercyclotron now put into operation, work has also been proceeding on the other atom-smashers: the linear accelerator and the cynchrotron.

Hamilton M. Jeffers, astronomer at Lick observatory, and Leland L. Cunningham, assistant professor of astronomy, made discoveries and calculations which forecast the greatest meteor shower of the century.

Studies with radioactive isotopes have already demonstrated usefulness in some cancer diagnoses and eventually may be used in studies of many life processes.

University scientists such as J. Robert Oppenheimer, professor of physics, and Glenn Seaborg, professor of chemistry, are advisors to the Atomic Energy commission and were instrumental in its formation.

Besides these five science developments of the year, other important happenings were the first flight of supersonic plane XS-1, production of two new anti-malarias, first births of animals from foster mothers, and photography of the solar spectrum above the ozone layer.

Super-Disintegrator ^{NEWSWEEK} _{1/21/47}

Prewar cyclotrons weighed only about 225 tons and developed just enough power to chip two or three particles off the atomic nucleus. Last week at Palo Alto, Calif., two of the nation's top atomic researchers revealed that the 4,000-ton postwar cyclotron installed at the University of California (NEWSWEEK, Nov. 18, 1946) has knocked out 22 and possibly 30 particles in "the most complete disintegration of atomic nuclei ever achieved by man."

Drs. Glenn T. Seaborg and Isadore Perlman made the report on the giant cyclotron at a meeting of the American Physical Society. They said that by using up to 400,000,000 electron volts of energy they had produced many atoms not known before, with good prospects that more than 100 new radioactive isotopes of the common elements would be yielded.

As an example of a light radioactive isotope identified in their experiments, the scientists cited iron 52. It was produced from the bombardment of copper, four

steps up the atomic scale. Previously no isotope of iron had been produced which was lighter than the stable isotope of this element, iron 53.

A scientist at the meeting explained the difference in strength of the prewar and postwar cyclotrons by comparing their operations with the changing of a building:

"With the old cyclotron of 225 tons, we could knock two or three floors off a 50-story building, or maybe add a floor or two. But with the new cyclotron we can knock that 50-story building into a flock of four-room bungalows, with a lot of nails and shingles left over."

S.F. CHRONICLE 1/12/47

U. S. 'Ten Outstanding Young Men' Named

Two Mayors Included on 1947 List

CHATTANOOGA, Tenn., Jan. 20 (AP)—Names of 10 young men chosen as "outstanding" in the United States in 1947, were announced today by the U. S. Junior Chamber of Commerce.

Selected by a panel of nine American business, industrial and professional men, the 10 include two Mayors, two Congressmen, two representatives of the atomic energy field, a blind radio engineer, a surgeon-anesthetist, a human relations expert, and an advocate of world government.

The 10 young men chosen were: Cord Meyer Jr., 27, president of United World Federalists, New York city.

Dr. Robert A. Hingson, 34, among the first to use the new invention, hypnospray, and a developer of caudal anesthesia to eliminate child-birth pain, Memphis, Tenn.

deLesseps S. Morrison, 35, Mayor of New Orleans.

LaVon P. Peterson, 28, blind founder of an engineering school for the blind, Omaha, Neb.

Dr. Glenn Theodore Seaborg, 35, nuclear chemist, whose work aided in the discovery of plutonium, Americium and curium, Berkeley, Calif.

Glenn Robert Davis, 33, Congressman, Waukesha, Wis.

Thomas R. Reid, 33, human relations expert, Baltimore, Md.

James Quigg Newton Jr., 35, Mayor of Denver, Colo.

Richard M. Nixon, 34, Congressman, Whittier, Calif.

Adrian Sanford Fisher, 33, Atomic Energy Commission counselor, Washington, D. C.

The young men will be introduced at a banquet here tomorrow night. Harold E. Stassen, outstanding young man of the year in 1938 and presidential aspirant, will speak.



PROF. GLENN SEABORG
Distinguished research

U. C. Professor Is Honored For Nuclear Physics Work

Dr. Glenn Theodore Seaborg yesterday was named one of the Nation's 10 "outstanding" young men.

At 35, Dr. Seaborg is one of the brightest stars in the new scientific age which ushered in the atomic bomb and promised peaceful uses of atomic energy.

A full professor at the University of California, Dr. Seaborg has spent his entire career there, except for the war years when he was on leave to the Metallurgical Laboratory of the University of Chicago—a key unit in development of the atomic bomb.

Dr. Seaborg was born at Ishpeming, Mich., April 19, 1912. He received his A. B. in chemistry from the University of California at Los Angeles in 1934. Three years later he was made a doctor of philosophy in chemistry at the University of California, Berkeley.

PLUTONIUM DISCOVERY

From 1937 to 1939 he was a research associate at Berkeley, an instructor from 1939 to 1941, an assistant professor from 1941 to 1945. He was made a professor in 1945.

His main field of investigation has been in nuclear chemistry and nuclear physics. In 1940 he was co-discoverer of plutonium—used in the Nagasaki atomic bomb.

At the University of Chicago, he

worked on chemical separation of plutonium. Procedures he developed were used at Clinton, Tenn., and Hanford, Wash., in the manufacture of materials for the bomb.

He also is codiscoverer of a fissionable isotope of Uranium 235 through which it may be possible to use thorium indirectly for atomic energy. He is codiscoverer of the long-lived isotope of neptunium and of the elements Americium and Curium.

RESEARCH AT U. C.

At present he is engaged in research at the University of California on the transuranium elements and on identification of nuclear reactions induced by use of the 184-inch cyclotron.

In 1946 he was appointed to the nine-man general advisory committee to the Atomic Energy Commission.

In 1946 Dr. Seaborg was named "chemist of the year" in an informal poll conducted by Chemical and Engineering News.

Last year he was awarded the Pure Chemistry Award of the American Chemical Society.

He also delivered the second annual Harrison Howe Memorial Lecture before the Rochester, N. Y. section of the A. C. S.

University Laboratories Semester Achievements Summarized

By Jack Bik '49

Scientific achievements came fast and thick in University laboratories this semester.

Up on the hill in the radiation laboratories, Glenn T. Seaborg, professor of chemistry, and his team of 20 research chemists spent their time learning more about the newly created and still mysterious transuranic elements.

These elements are so called because they are heavier than uranium, which is the heaviest element to be found in nature. These elements are not found in nature but are made by bombarding simpler elements by various radiations.

One of the most notable achievements in that field was the production of curium 242, which is now the heaviest element in existence. A new variation of neptunium was produced which is capable of producing atomic energy but no explosions.

The discovery that a new variation of uranium, U-233, was capable of producing atomic bombs was reported by Seaborg. This variation was made from widely occurring thorium, element 91.

Another great achievement in science occurred when the 184-inch cyclotron was finally put into operation on Nov. 1. On that day, it produced 200,000,000 electron volts, ten times what was ever produced in the previous 225 ton cyclotron.

Another scientific discovery announced this semester was made at

the University's Lick observatory. Nicholas U. Myall, assistant astronomer, found that the globular star clusters, which were thought to stand still really revolved. This meant an entire recalculation of the speed of the sun's circular motion.

Meanwhile in the Life Science building, scientists were experimenting with turning rats into giants. As a result of these experiments, scientists found that there was one chemical and one alone responsible for growth.

Research into the mysterious cosmic rays coming from outer space caused Robert D. Brode, professor of physics, together with several of his assistants, to journey to Inyokern naval base, where they took a cloud chamber ray detector up 40,000 feet in a specially prepared B-29.

Other discoveries announced, were the explanation of the ocean's blue color; the exact measurement of the mesotron, little known particle thought to bind together the atom; research in artificial limbs; germ warfare research, and breast cancer diagnosis with radioactive "tracers."

Waldemar Kaempffert

NEW EXPLOSIVE ATOM DISCOVERED

It used to be supposed that there are only ninety-two elements. These have been listed in "the periodic table." At the top stands the lightest of all, hydrogen; at the bottom stands uranium, the heaviest. The elements are arranged in the order of their weights. Uranium, the ninety-second, is 238 times as heavy as hydrogen. That is why physicists speak of uranium 238.

Years ago it was discovered that the elements are not all of one kind. There are at least three kinds of hydrogen, for example, two of chlorine and one of carbon. A chemist cannot distinguish one form of hydrogen, chlorine or carbon from another, but a physicist can by weighing their atoms. So we have "isotopes," which means "same place," the place being that which the element occupies in the periodic table.

Uranium has several isotopes, and all occupy the ninety-second place in the table. The most common is the 238 variety, which weighs 238 times as much as hydrogen. But the ore of this common 238 also contains other uraniums. One of these, designated as 235 because it weighs 235 times as much as hydrogen, will explode when enough of it is assembled in a mass that lies somewhere between 2.2 and 230 pounds.

Another bomb material is plutonium, which is not found in nature and which is produced when uranium 238 is struck by fast neutrons. When an atom of uranium 238 is thus struck it absorbs a neutron, whereupon neptunium is formed. Neptunium breaks down spontaneously into plutonium, with which the bomb that destroyed the Japanese city of Nagasaki was loaded.

Last week the news came from Berkeley, Calif., that Prof. Glenn T. Seaborg had discovered an isotope of neptunium, which is 237 times heavier than hydrogen. The neptunium 237 is produced during the so-called chain reaction, that is, when neutrons fly out of one atom to board another and release more.

This is not the end of the story. Professor Seaborg also announced that he had discovered three other types of neptunium—234, 235 and 236, and a new form of plutonium which has been designated 241.

To what uses these newly discovered radioactive isotopes can be put is not known as yet. Possibly they will enable physicians to treat certain diseases, such as cancer, and probably they can be used as "tracers" to find out more about physiological processes.

1/47

Chemist of the Year

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January, 1947

President Truman to assist the United States Atomic Energy Commission. During the war he directed chemical research on plutonium and other heavy elements at the University of Chicago Metallurgical Laboratory.

He was recently elected a Councilor-at-Large of the American Chemical Society.

1/47

FRIDAY LUNCH
S.F. CHAMBERLAIN



Chemist Honored

Professor Glenn T. Seaborg, 34, (above), head of the University of California chemistry department, has been named "chemist of the year" by fellow scientists throughout the Nation in a poll conducted by Chemical and Engineering News, publication of the American Chemical Society. His research figured prominently in development of atomic energy.

TWO UNIVERSITY scientists, J. Robert Oppenheimer and Glenn T. Seaborg, have been named by President Truman to the general advisory committee of the Atomic Energy Commission. Both played leading roles in development of the atomic bomb, and Oppenheimer was a member of the committee which wrote the Acheson-Lilienthal report on atomic energy. CALIF. ITALY 1/47

CANADIAN CHEMISTRY, 1/47 "Frontiers in Chemistry"

The newly created trans-uranium elements, heavy hydrogen, artificial radioactivity, high vacuum distillation, and the chemical bonds within carbon compounds will be among the subjects in the sixth annual Frontiers in Chemistry lectures at Western Reserve University in February, March, and April.

Among the 12 scientists to appear in the lecture series are Dr. Glenn T. Seaborg, professor of chemistry, University of California, who was responsible for the creation of four new chemical elements; Dr. Harold C. Urey, professor of physics, Institute of Nuclear Studies, University of Chicago, Nobel prize winner and discoverer of heavy hydrogen, and Dr. K. C. D. Hickman, research chemist, Distillation Products Corporation, Rochester, N.Y., who is known for his use of distillation for the isolation of vitamins.

The Frontiers series will be divided into two sections. The first will deal with recent advances in physical and inorganic chemistry, and the second with modern theories of organic chemistry. The first part will begin February 28 and run consecutive Fridays through April 4. The second will begin April 18 and run consecutive Fridays through May 23.

The subjects, lecturers, and dates are:

Theory of Reaction Rates, Professor Farrington Daniels, University of Wisconsin, February 28; Distillation Theory and Practice, Professor E. R. Gilliland, Massachusetts Institute of Technology, March 7; High Vacuum Distillation, Dr. Hickman, March 14; Trans-Uranium Elements, Professor Seaborg, March 21; The Chemistry of Deuterium, Professor Urey, March 28, and Artificial Radioactivity, Professor Philip Morrison, Cornell University.

The Chemical Bond and Resonance, Professor G. W. Wheland, University of Chicago, April 18; Electrochemical Theory of Organic Reactions, Professor John R. Johnson, Cornell University, April 25; Free Radical Mechanisms, Dr. Frank R. Mayo, United States Rubber Co., May 2; Carbonium Ion Mechanisms, Professor Charles C. Price, Notre Dame University, May 9; Reaction Rates and Mechanisms, Professor Louis P. Hammett, Columbia University, May 16, and Bond Distances and Molecular Structure, Professor Lawrence O. Brockway, University of Michigan, May 23.

Dr. Seaborg Will Speak In Detroit

DETROIT, March 7 — Ishpeming-born Dr. Glenn T. Seaborg, who has been selected as "chemist of the year" for 1946 in a nationwide poll of chemists and engineers by the American Chemical society, will return to Michigan for an address Monday, March 24, in Detroit. His talk will be a part of "A Record of Chemical Progress" series by leading scientists of the United States on the Wayne University campus and is scheduled for 7 p. m. in Room 314 of Wayne's main building.

Co-discoverer of plutonium, man-made source of atomic energy and of the transuranic elements 95 (americium) and 96 (curium), Dr. Seaborg directed that phase of the atomic bomb project concerned with chemical research on plutonium and other heavy elements. He was credited with the better-than-anticipated speed with which the atomic material was produced.

Dr. Seaborg is a member of the nine-man general advisory committee appointed by President Truman to assist the Atomic Energy Commission. He has been a member of the University of California staff since 1937.

Dr. Seaborg spent the first 10 years of his life at Ishpeming, where he learned how to ski and caddied on the local golf course. He holds a doctor's degree in chemistry from the university where he is now a staff member.

Sponsorship of the lecture series in Detroit is shared by Wayne's chemistry department and the International Society of the Friends of the Kresge-Hooker Scientific Library.

3/7/47

Quiz Kid Plans Career in Chemistry

RICHARD WILLIAMS, ex-Quiz Kid, has "almost" decided on chemistry as his career. Richard is known as the super Quiz Kid, having made more appearances on the program than any other Kid. He retired in December 1945 when he reached the old age of 16.



"I guess it was the war that made me decide to be a chemical engineer," said Richard. "My brother, Glenn, who is five years older, was a sergeant during the war and worked in the atomic bomb laboratory at Los Alamos, N. Mex. And I just decided that chemistry must be the most exciting science of all. Before that I wanted to be an electrical engineer."

Richard is now in his third year at the University of Chicago where he is taking a straight liberal arts course. After two

years he wants to begin work on his master's degree in chemical engineering at one of the technical institutes, preferably California Institute of Technology.

Already Richard has had two offers of jobs when he's out of school. Charles Kettering of General Motors, an avid listener to the Quiz Kids, liked Richard after hearing him over the air. He was amazed at Richard's great mathematical ability and invited the entire family to visit the General Motors research department in Detroit. After he had spent the afternoon showing Richard and Glenn the laboratories, he told both boys to drop in and see him when they got out of school. Richard was also entertained by the Firestone Co. in Akron and left with the same instructions.

Richard first went on the Quiz Kids show when he was ten years old, and since has made the all-time record of 213 appearances.

It was Richard who asked the question of Glenn T. Seaborg, when he was a guest on the Quiz Kids program in November 1945, which led to the first radio announcement of the discovery of a new element. When Richard inquired whether there has been any other transuranium elements discovered besides neptunium and plutonium, Dr. Seaborg told him, and the radio audience, about elements 95 and 96, anticipating the scheduled announcement in his paper before the Chicago Section of the AMERICAN CHEMICAL SOCIETY the following week.

Although he could have entered college when he was ten, he remained in grade school. His I.Q. of over 200 is the highest ever recorded at the University of Chicago.

2/17/47

CHEMICAL AND ENGINEERING NEWS

CLEVELAND, O. 3/17

W. R. U. Lecturer Visions A-Plane With Giant Shield

BY JAMES D. HARTSHORNE

Atomic power for piloted aircraft will require planes capable of carrying a load of 100 to 200 tons for the power plant alone, Dr. Glenn T. Seaborg, one of the nation's leading nuclear scientists, said in an interview here late yesterday.

That weight would be required for shielding to protect the occupants of an atomic-powered plane, Dr. Seaborg said.

The scientist said that application of atomic power to aircraft is "a long range development," but he thought the project feasible.

Plans are now being talked about for planes which would carry 200,000 gallons of gasoline," he said. "Such a plane could carry an atomic power plant."

Application of atomic power on any considerable scale to everyday living is at least 10 years away, Dr. Seaborg estimated.

"It's a matter of how much effort is put into it and whether research runs its course without abnormal pressure," he added.

Problems of shielding persons

from radioactivity of atomic power installations and of disposal of radioactive byproducts of atomic power are among the chief obstacles in the everyday application of the new energy source, according to Dr. Seaborg.

He thought that atomic byproducts useful in medical research, such as "tracers," might eventually prove of far greater value to mankind than application of atomic power.

Dr. Seaborg was in Cleveland to lecture in the "Frontiers in Chemistry" series at Western Reserve University last night.

One of the next goals of nuclear scientists is the conversion of energy into matter, he told his Western Reserve audience during the question period. This would be the reverse of what happened when the atomic bomb was developed.

Other goals, he said, include accelerating nuclear particles to at least a billion electron volts. Acceleration of 400,000,000 volts is about the limit so far attained. A third goal would be to create mesotrons, a particle in the cosmic ray which in mass is between electron and the proton. The mesotron, he said, has never been made by artificial means.

Dr. Seaborg, 34, a professor of chemistry at the University of California, lectured on the four new "Transuranium Elements," which he helped to create.



DR. GLENN T. SEABORG



Seaborg: Kudos collector

FORTNIGHT, January 13, 1947

Named outstanding young man of 1945 by the Chicago Junior Association of Commerce, Seaborg has an interesting working philosophy which has probably contributed to his success:

"I try always to keep my eye on the practical objectives, not getting sidetracked on the more interesting *basic* things."

The world of science wonders what objective Seaborg's high-powered orbs will view next.

Too Busy For Blast

By IRMENGARD POHRT

A co-discoverer of plutonium, nuclear element in the atom bomb, has been too busy with research work to watch any of the bomb explosions.

This earnest young University of California chemistry professor, Dr. Glenn T. Seaborg, who worked three and a half years to find plutonium, is in Detroit to speak to Wayne University chemistry professors and students.

"I could have gone to Bikini for the tests there," Dr. Seaborg said. "But I didn't want to take the time."

Since the discovery of plutonium he has discovered the transuranic elements americium and curium, which aided the course of atomic research.

The atom will not be unleashed for industrial use for at least 10 years, Dr. Seaborg predicted.

One pound of plutonium, he said, equals 10,000,000 kilowatt hours, whereas one pound of coal equals only four kilowatt hours.

INDIANAPOLIS, IND.

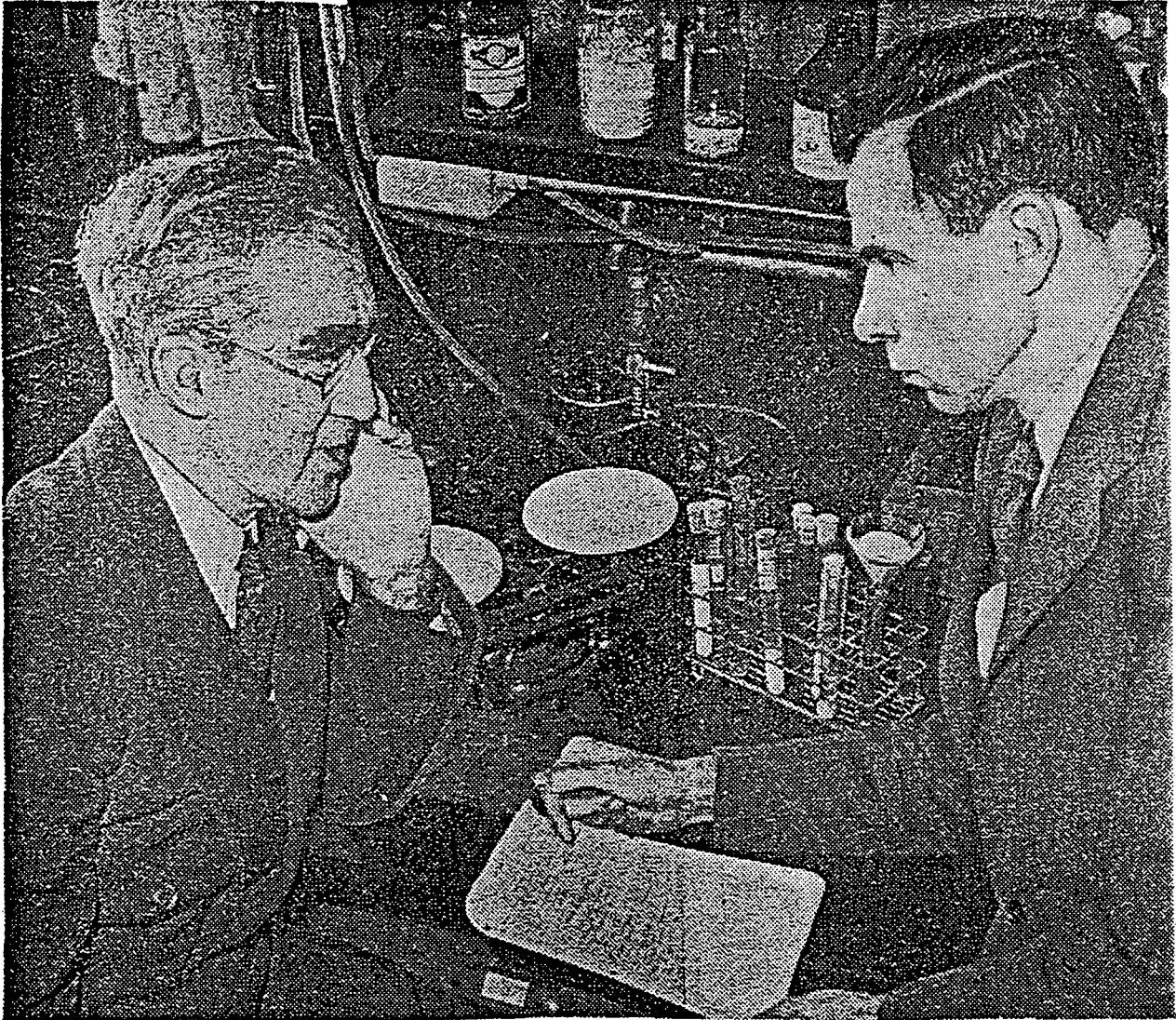


'Chemist of the Year' in 1946 to Speak Here

Dr. Glenn T. Seaborg, regarded one of the world's foremost nuclear chemists and co-discoverer of plutonium, man-made source of atomic Energy" will speak at the Hotel Warren this evening for the Indiana Section of the American Chemical Society on "Plutonium and Nuclear Energy." Dr. Seaborg, 34, who is professor of chemistry in the University of California, was named "Chemist of the Year" in 1946, in recognition of his contributions to nuclear science.

ATOM SCIENTIST IN DETI

Detroit Times, March 25,



Detroit Times Photo

Dr. N. E. Gordon (left) of the Wayne University chemistry department talking shop with Dr. Glenn T. Seaborg, co-discoverer of plutonium (a nuclear element used in the atomic bomb). Dr. Seaborg was at Wayne U. to lecture on chemical developments.

~~Thought~~ — Professor Glenn T. Seaborg, of the chemistry department, University of California, will speak on the "Scientific Background for Atomic Energy" (KQW —9:30 p. m.)

When the war ended, Dr. Glenn T. Seaborg, young professor of chemistry at the University of California, could hardly have been called a famous scientist. But behind secret laboratory gates he had played an outstanding role. He was a leader in the new kind of atomic chemistry that has outdone the medieval dreams of alchemy by producing elements more precious than gold. After the war it could be told that he was co-discoverer of three new elements—plutonium, americium, and curium*—and an important contributor to the process of separating plutonium on a large scale for use in atomic bombs.

In last week's issue of *The Physical Review*, the nation's leading journal of nuclear science, a brief back-page note in the matter-of-fact language of scientists credited Seaborg with still another major achievement—five years late. "For historical purposes," the *Review* published a short, still expurgated paper dated April 13, 1942, signed by G. T. Seaborg, J. W. Gofman, and R. W. Stoughton, and reporting the discovery that thorium can be converted into a fissionable material useful for atomic bombs or atomic power.

Entitled "Nuclear Properties of U-233: a New Fissionable Isotope of Uranium," the paper tells how five years ago, when Seaborg was just approaching 30, he and Gofman and Stoughton used slow neutrons to transform thorium into a few micrograms of uranium with an atomic weight of 233. Then they proved that this substance, like the famous U-235, underwent fission.

The discovery was so vital to any plan for international control of atomic energy that it was especially declassified last year for transmission to the United Nations. It also has the mining engineers of many nations rechecking their resources of thorium—more abundant in nature than uranium.

1320 KEELY GAZETTE
G. E. Appoints
UC Professor 4/7/47

The General Electric Co. today announced the appointment of Dr. Glenn T. Seaborg, University of California professor, as research laboratory consultant in nucleonics.

Seaborg is co-discoverer of the artificial element plutonium used in the atomic bomb. During the war, he was connected with metallurgical laboratory of the University of Chicago where the first chain-reacting atomic pile was built.

PITTSBURGH, PA.
SUN TELEGRAPH

~~APR 17 1947~~

Chemist Wins Award

ATLANTIC CITY, N. J., April 16.—(AP.)—Prof. Glenn T. Seaborg, 34, of the University of California, co-discoverer of plutonium, man-made source of atomic energy, has been awarded the \$1000 American Chemical Society prize in pure chemistry for 1947, it was announced last night.

4/16/47

CHICAGO, ILL.
TIMES

APR 16 1947



Cite atom scientist—

Convening at Atlantic City, N. J., American Chemical society awards \$1,000 prize in pure chemistry to Prof. Glenn T. Seaborg, 34, of University of California.

NEW YORK, N. Y.
JOURNAL OF COMMERCE

APR 16 1947

Seaborg Wins Pure Chemistry Prize

(Special to Journal of Commerce)

ATLANTIC CITY, N. J., April 15.—Professor Glen T. Seaborg co-discoverer of plutonium, man-made source of atomic energy, was named recipient here tonight of the \$1,000 American Chemical Society prize in pure chemistry for 1947.

He will receive the award, given for his direction of the research program that led to the discovery and isolation of plutonium and also americum and curium, elements 95 and 96, at the fall meeting of the American Chemical Society in New York next September.

A professor at the University of California, Seaborg was recently appointed consultant in nucleonics at the Schenectady, N. Y., research laboratory of the General Electric Co. He was chosen "Chemist of the Year" in a nation-wide poll of chemists.

APR 16 1947

Seaborg Wins New Prize

Dr. Glenn T. Seaborg, famed young microchemist of the University of California, yesterday was awarded the \$1,000 American Chemical Society prize in pure chemistry for 1947.

With this award, Doctor Seaborg has won all but one of the coveted honors in the field of chemistry.

The exception is the Nobel Prize—and his associates at the university declare that honor too will come to him in time.

Seaborg, 34, tall, thin and slow-spoken, was the co-discoverer of plutonium, the explosive atom of the Nagasaki bomb. He directed all of the vast chemical research carried out with plutonium during the war.

Seaborg to Advise General Electric

SCHENECTADY, N. Y., April 6.—(AP)—Dr. Glenn T. Seaborg, University of California chemistry professor and atomic scientist, today was named consultant in nucleonics to the General Electric Company Research Laboratory.

Dr. Seaborg is the co-discoverer of three or four new elements heavier than uranium, used in the atomic bomb.

DENVER, COLO.
ROCKY MT. NEWS

APR 16 1947

Honor Plutonium Finder

ATLANTIC CITY, N. J., April 15.—(AP)—Prof. Glenn T. Seaborg, 34, of the University of California, co-discoverer of plutonium, man-made source of atomic energy, has been awarded the \$1000 American Chemical Society prize in pure chemistry for 1947, it was announced tonight.

U. C. Professor Wins Pure Chemistry Prize

Professor Glenn T. Seaborg of the University of California yesterday was awarded the \$1000 American Chemical Society prize in Pure Chemistry.

Seaborg, 34-year-old co-discoverer of plutonium, source of man-made atomic energy, has been on the faculty of the University of California since 1939.

The award was made in Atlantic City.

OAK RIDGE SPEEDS ELEMENT OUTPUT

Production of Carbon 14 in 4
Months Equals That of 250
Cyclotron-Years

COST IS SHARPLY REDUCED

President-elect of Chemical
Society Stresses Aid to
Biological Investigations

By WILLIAM L. LAURENCE
Special to THE NEW YORK TIMES.

ATLANTIC CITY, N. J., April 15—The atomic fire now burning in the Tennessee Valley is producing new elements, of incalculable importance to civilization, in quantities from a thousand to a million times larger than formerly could be produced with the cyclotron.

Dr. Charles A. Thomas, president-elect of the American Chemical Society and director of the Clinton Laboratories of the Atomic Energy Commission at Oak Ridge, Tenn., revealed this tonight at the society's annual spring meeting.

Dr. Thomas, vice president and director of research for the Monsanto Chemical Company was the principal speaker at a dinner of Alpha Chi Sigma, national chemical fraternity, at which it was announced that the society's \$1,000 prize in pure chemistry had been awarded to Prof. Glenn T. Seaborg of the University of California, co-discoverer of plutonium and of americium and curium, Elements 94, 95 and 96, respectively.

To produce one millicurie (a unit of radioactivity equivalent to that produced by one milligram of radium) of carbon of atomic weight 14, Dr. Thomas said, would have required the operation of five efficient cyclotrons running continuously for one year. This millicurie, he pointed out, would therefore cost in the neighborhood of a million dollars.

On the other hand, he added, with a small uranium-graphite pile

WINS CHEMISTS' AWARD



Prof. Glenn T. Seaborg
The New York Times

"hundreds of millicuries are already available."

Fifty Millicuries in Four Months

"In the first four months of isotope production," he reported, "the pile at Oak Ridge produced fifty millicuries of carbon 14. With normal cyclotron production this would have taken 250 cyclotron years.

"The cost of producing a millicurie of carbon 14 by the pile is not a million dollars but many times less. The present price to research workers by the Government is \$50 per millicurie. The production of many other radio-isotopes by the pile is much greater and much less expensive than carbon 14. Radioactive phosphorus of atomic weight 32 costs less than \$2 per millicurie to produce.

"We are very fortunate indeed to be able to produce the isotopes which lend themselves so readily for biological and chemical investigations, such as hydrogen of atomic weight 3, sodium of atomic weight 24, sulphur 35, chlorine 36, iron 55, iodine 131, to mention a few.

"One of the most promising uses for carbon 14 is in furthering the study of that most important reaction—photosynthesis [the pro-

cess whereby plants harness the energy of sunlight to produce food in which the energy is stored].

"We are hopeful that photosynthesis investigations will be greatly aided by the use of radioactive carbon 14, inasmuch as the products can be isolated and identified."

Sees New Horizons Opened

Dr. Thomas pictured a brave new world of chemistry opened up by the advent of the mass production of radioactive forms of the elements. They open new horizons in virtually every field of pure and applied chemistry, he pointed out.

"In the field of industrial hygiene and public health," he said, "radioactive tracers might be used to detect pollution of water supply, such as investigating underground connections between bodies of water. Also drainage from various sewage disposal systems, such as cesspools, could be investigated.

"In the field of agriculture many possibilities present themselves. Already the utilization of fertilizers is being worked on. Studies with 'tagged atoms' here give us information on the efficiency of a particular fertilizer—how it is picked up by the different plants with different modes of application. Of current interest is the utilization of fertilization through leaf spray.

"Sap flow in dormant trees in the winter months is not well understood. At the present time radioactive phosphorus is being used as a means of following the daytime sap flow through dormant maple trees.

"Likewise in agriculture, tracers should prove of value in following the distribution of inorganic constituents through the soil and testing fertilizer requirements of different soils.

"The insect menace is ever with us. Work is being done on the use of small amounts of radioactive materials sprayed on migratory insect pests. In this way it is possible to determine their migration speeds, origins and routes of travel.

"A very practical use of radioactive materials is to ionize the air near moving machinery, particularly near belts, so that static can be eliminated. This static, as you know, constitutes a serious hazard where dust from grain and other organic materials or combustible vapors are present.

"The preserving of food from bacterial decay is a problem of great importance. The intense radiation from fission products might be used to destroy bacteria in foods, thus preserving them for

NEW YORK, N. Y.
WORLD-TELEGRAM

APR 16 1947

Chemists Award Prize

Special to the World-Telegram.

ATLANTIC CITY, April 16.—The American Chemical Society 1947 prize of \$1000 for achievements in pure chemistry was awarded today to Prof. Glenn T. Seaborg, codiscoverer of plutonium, source of atomic energy.



DR. GLENN T. SEABORG
U of C professor

OAKLAND, CAL.
TRIBUNE

APR 16 1947

U.C. A-Bomb Savant Wins New Award

Dr. Glenn T. Seaborg, 34, University of California microchemist and co-discoverer of the atomic bomb ingredient, plutonium, today had been awarded the \$1000 American Chemical Society prize in pure chemistry for 1947.

The award topped all those Dr. Seaborg has won and left him only the Nobel Prize to complete his scientific honors. Dr. Seaborg directed all of the vast chemical research on plutonium during the war and was one of the molders of the atomic bomb.

BELLEVILLE GAZETTE

4/15/47

Discovery of U-233 by U. C. Scientists Told in Article

Discovery of uranium 233, the third known potential source of atomic power and one of the closely guarded secrets of World War II today has been published for the first time in scientific literature.

A technical article in the current issue of the "Physical Review" describes how three University of California scientists first isolated uranium 233 from thorium in late 1941 and early 1942. The scientists are Prof. Glenn T. Seaborg, noted nuclear chemist, Dr. R. W. Stoughton, and J. W. Gofman.

Thorium was bombarded with slow neutrons in the University's 225-ton cyclotron, and from the bombarded substance Professor Seaborg and his associates isolated a millionth of a gram of uranium 233.

Experiments with this, the world's first supply of the new synthetic isotope, subsequently proved that uranium 233 undergoes fission with neutrons, much as does uranium 235, which was the first substance known to be suitable as an atomic fuel.

Thus it was demonstrated that the world's supply of thorium is potentially useful for atomic energy. Uranium 233 can be made by bombarding thorium in atomic piles, using uranium as fuel.

CHAIN REACTION

The "Physical Review" article does not state how unstable uranium 233 is, but the Scientific and Technical Committee of the United Nations Atomic Energy Commission has indicated that nuclear energy can be obtained from it by a chain reaction.

The discovery has increased the potential and versatility of atomic energy. Both plutonium and uranium 235, the other two known nuclear fuels, come from uranium ore, which is relatively scarce. It is estimated that there is five times as much thorium as uranium in the earth's crust.

OMAHA, NEBR.
MORNING WORLD-HERALD
APR 16 1947

ALSO IN EVE WORLD-HERALD

Chemistry Prize Awarded

Atlantic City, N. J. (AP)—Prof. Glenn T. Seaborg, 34, of the University of California, co-discoverer of plutonium, man-made source of atomic energy, has been awarded the one thousand dollar American Chemical Society prize in pure chemistry for 1947, it was announced Tuesday night.

ALSO IN:
OMAHA, NEB. MORN. WLD. HER.
EVE

Forum Slates Seaborg as Fifth Speaker

The fifth session of the chemical lecture series will be presented by Dr. Glenn T. Seaborg, professor of chemistry at the University of California, at 4 p.m. today in room 211 of the main building.

The lecture "Chemistry of the Trans-Uranium Elements" will be open to all those who registered for the series, announced Dr. Neil Gordon, professor of chemistry.

Dr. Seaborg, known for his discovery of plutonium, the source of atomic energy, and the two trans-uranic elements, americium and curium, was voted the chemist of the year for 1946.

The series of eight lectures are being sponsored by the chemistry department and the International Society of the Friends of the Kresge-Hooker scientific library.

The next lecture in the group will be delivered on Wednesday, April 9 by C. F. Kettering, research director of General Motors. The remaining lectures will be given on April 21 and April 28.

long periods. This is a problem now being worked on."

Invasion by Viruses Studied

Studies of the chemical processes taking place within cells invaded by viruses, which shed light on the manner wherewith the virus utilizes the materials needed for the cell's normal function for its own parasitic purposes, were presented before the division of biological chemistry by Dr. Seymour S. Cohen of the School of Medicine, University of Pennsylvania.

The studies revealed that the type of virus investigated utilizes the synthesizing faculties of the most cell to produce a special substance known as desoxy-ribose nucleic acid, which the virus then utilizes for its own growth. The substance is produced by the virus out of materials of the host cell, which the latter needs for its own growth and well being. The virus thus acts like an invader who forces the native population to produce his own special food while the victim dies of starvation.

"If other virus diseases, more directly affecting humans, behave similarly," Dr. Cohen said, "it would be desirable to learn which virus components are synthesized in these infections. It should then be possible to interfere with the utilization of specific components to prevent the growth of the virus. However, it will be more difficult to study this in virus diseases affecting human beings."

Streptomycin has assumed the role of policeman in controlling and improving the process by which it is produced, according to a report presented by C. J. Christensen, Dr. F. J. Rudert and Dr. Milton J. Foter of the William S. Merrell Company of Cincinnati.

The end result of the controlled process was said to be a substantial increase in the total volume of streptomycin produced from a given quantity of culture, the amount being actually greater than that obtained from the fresh parent strain.

Growth of Bacteria Stifled

Discovery of a new chemical compound stifles the growth of bacteria by cutting off their food supply was disclosed in a paper by Prof. Karl Dittmer, Harlan Goering and Irving Goodman of the University of Colorado.

The new compounds, allylglycine, is almost identical to cystein, one of the common amino acids on which micro-organisms feed, according to the paper, which explained that allylglycine blocks the digestion of cysteine as an ill-fitting slug would block the coin slot of a toll telephone.

Synthetic chemicals with power-

ful antibiotic properties resembling those of penicillic acid are being tested, it was disclosed in a paper by Merritt C. Fernald and Walter B. Geiger of the New Jersey Agricultural Experiment Station, Rutgers University.

The antibacterial activity of some of the natural antibiotics, notably clavacin and penicillic acid, was found to depend on certain chemical groups, known as unsaturated ketones, which they contained. Similar synthetic compounds, prepared in the laboratory, have demonstrated startling power to kill microbes and fungus growths, according to the paper.

The potency of the new compounds has been demonstrated by laboratory testing. They are said to control gram-negative bacteria, such as the colon bacillus, in dilutions as high as one part in a hundred thousand, and gram-positive bacteria, such as certain streptococci, in dilutions up to one part in a million. Even when diluted three million times, they have been found particularly active against a fungus causing ringworm.

NEW YORK, N. Y.
JOURNAL AMERICAN

APR 16 1947

Atom Expert Honored

ATLANTIC CITY, April 16 (AP). —Prof. Glenn T. Seaborg, 34, of the University of California, co-discoverer of plutonium, man-made source of atomic energy, has been awarded the \$1,000 American Chemical Society prize in pure chemistry for 1947.

ALS IN N.Y. JOURNAL AMERICAN

LOUISVILLE, KY.
COURIER-JOURNAL

APR 16 1947

Atom Scientist Honored

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SAN BERNARDINO, CALIF.
SUN

APR 17 1947

Chemistry Award

ATLANTIC CITY, N. J., April 16 (AP)—Prof. Glenn T. Seaborg, 34, of the University of California, co-discoverer of Plutonium, man-made source of atomic energy, has been awarded the \$1,000 American chemical society prize in pure chemistry for 1947, it was announced tonight.

KANSAS CITY, MO.
STAR

APR 16 1947

PRIZE TO A CHEMIST.

Glenn T. Seaborg One of the Discoverers of Plutonium.

ATLANTIC CITY, N. J., April 15 (AP)—Prof. Glenn T. Seaborg, 34, of the University of California, co-discoverer of plutonium, man-made source of atomic energy, has been awarded the \$1,000 American Chemical Society prize in pure chemistry for 1947, it was announced tonight.

ALS IN KANSAS CITY, MO. TIMES

SYRACUSE, N. Y.
POST-STANDARD

APR 16 1947

WINS CHEMISTRY PRIZE

ATLANTIC CITY, N. J. (AP)—Prof. Glenn T. Seaborg, 34, of the University of California, co-discoverer of plutonium, man-made source of atomic energy, has been awarded the \$1,000 American Chemical Society prize in pure chemistry for 1947 it was announced last night.

Bigness and Greatness

With more than 40,000 students enrolled on the several campuses, the University of California can lay claim to being the second largest university in America in point of population. Only New York University, with 47,000, is larger, while Columbia, once largest of all, trails with 37,699, according to the last available census.

Size, of course, is not an index of greatness, so we are more impressed with another gauge that indicates the Big C has become one of the world's great centers of culture and scientific achievement. We speak of the ever-growing list of national and international honors won by staff members of the university.

Last week nine University of California faculty members won Guggenheim fellowships for projects in physiology, chemistry, physics, music, history, and other fields. No other university has won so many of these coveted fellowships. Last week, Professor Glenn T. Seaborg won the American Chemical Society's \$1000 prize and was named "leading chemist of the year." He was also appointed by President Truman to the advisory committee of the Atomic Energy Commission. Another Californian on the committee is Professor J. Robert Oppenheimer, wartime director of the Los Alamos atomic bomb plant.

Honors in the field of nuclear energy continue to flow into the Berkeley campus. Professor Ernest O. Lawrence, Nobel prize winner and inventor of the cyclotron, received the honorary Doctor of Science degree from McGill University, Montreal; Dr. Leonard Loeb was chosen to deliver the 38th annual Kelvin Lecture at the Institution of Electrical Engineers, London (the second American to win that honor); Professor Robert S. Stone won the Radiological Society of North America's gold medal—the first awarded since 1941—for "unusual service to the science of radiology;" Professors Stone, Lawrence, and Dean Stafford L. Warren of the Medical School received Distinguished Service Medals from Major General Leslie Groves for their work with the Manhattan District.

In other fields:

Dr. Karl F. Meyer, director of the Hooper Foundation for Medical Research, won the Sedgwich Memorial for outstanding service in public health.

Dr. A. L. Kroeber, professor of anthropology, emeritus, received the Viking Fund gold medal for distinguished achievement in cultural anthropology.

SAN FRANCISCO, CALIF.
CHRONICLE

APR 22 1947

Professor Luis W. Alvarez, of the Radiation Laboratory, won the Distinguished Collier Trophy for development of the Ground Controlled Approach System for blind flying.

These are only random examples; the list goes on and on.

It is not contended here that the achievement of outside honors is any conclusive index to the manner in which the University of California is performing its greatest function—the instruction of young Californians. But it is a demonstration of the aggressive attitude of the University faculty toward the multiple problems of our intricate civilization, and that should be a source of pride to all who contribute to the University's maintenance, and that means all of us. To the extent to which this spirit is transmitted to the undergraduates, the University of California will fulfill its main mission. There is increasing evidence that that task, too, is being well performed.

THE CLIPPING CO.
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4-26-47

NEW HONORS FOR DR. GLENN SEABORG

Professor Glenn T. Seaborg of the University of California, co-discoverer of plutonium, man-made source of atomic energy, has been awarded the \$1,000 American Chemical society prize in pure chemistry for 1947, it was announced at a dinner of Alpha Chi Sigma, in Atlantic City, N. J. national chemical fraternity which sponsors the award. The dinner was held in connection with the 111th national meeting of the society, of which Professor Seaborg is a councilor-at-large.

The prize, given annually to encourage fundamental studies by young chemists working in North America, goes to Professor Seaborg for his leadership in the field of nuclear chemistry and his direction of the research program leading to the discovery and isolation of plutonium and also americium and curium, elements 95 and 69.

Professor Seaborg, who is 34 years old, is a member of the nine-man general advisory committee appointed by President Truman to assist the United States Atomic Energy commission. He was chosen "Chemist of the Year" in a nationwide poll of chemists and chemical engineers conducted by "Chemical and Engineering News," publication of the American Chemical society.

Born at Ishpeming, Mich., Professor Seaborg received the Bachelor of Arts degree from the University of California in 1934 and the Doctor of Philosophy degree in 1937. After serving as an assistant in chemistry for two years, he became an instructor in 1939 and rose to the rank of full professor in six years.

During the war, on a leave of absence from California, he directed chemical research on plutonium and other heavy elements for the atomic bomb project at the University of Chicago metallurgical laboratory. He received the 1945 distinguished service award of the Chicago Junior Association of Commerce, and last year was chosen Harrison Howe lecturer by the Rochester section of the American Chemical society. Recently Professor Seaborg was appointed consultant in nucleonics at the General Electric company research laboratory in Schenectady, N. Y.

The American Chemical society prize in pure chemistry was founded in 1931 by the late A. C. Langmuir and is awarded in recognition of outstanding achievement in research characterized by independence of thought and originality. Previous recipients were: Linus Pauling, Oskar Knofler Rice, F. H. Spedding, C. Frederick Koelsch, Raymond M. Fuoss, John Gamble Kirkwood, E. Bright Wilson, Jr., Paul Doughty Bartlett, Lawrence Olin Brockway, Karl A. Folkers, John Lawrence Onlay, Kenneth Sanborn Pitzer, Arthur C. Cope, Frederick T. Wall, and Charles Coalter III.

PRO-BRANCH NEWS

-- An occasional publication of the Professional Branch of Alpha Chi Sigma --

Vol. 1, No. 5

April 1947

GLENN T. SEABORG ANNOUNCED RECIPIENT 1947 ACS AWARD

GLENN T. SEABORG --

(Continued from Page 1, Column 2)

man. He is a member of the General Electric Nucleonics Consultants and of the International Committee on Radioactive Constants. Recent honors bestowed upon him were his appointment as the Harrison Howe Lecturer of 1946 and his selection in a nation-wide poll of chemists and chemical engineers conducted by "Chemical and Engineering News" as "Chemist for the Year 1946".

Alpha Chi Sigma is proud to have Dr. Seaborg as a member. He was initiated into the fraternity in 1935 at the University of California in Los Angeles and is a charter member of Beta Gamma Chapter.

Dr. Glenn T. Seaborg of the University of California, co-discoverer of the elements plutonium, americium and curium, and a renowned authority on nuclear chemistry and nuclear physics, has been chosen as the recipient for the 1947 American Chemical Society Award in Pure Chemistry, which is sponsored by Alpha Chi Sigma. By courtesy of the American Chemical Society this award to Dr. Seaborg was announced for the first time at the Alpha Chi Sigma dinner on Tuesday evening, April 15, at the Atlantic City meeting of the Society.

Dr. Seaborg is only 35 years old but is already a world figure in the atomic energy picture. He did his undergraduate work at the University of California in Los Angeles and his graduate work, which lead to a Ph.D. degree in chemistry, at the University of California in Berkeley. Following his formal training he remained at Berkeley to serve first as research associate of the late Gilbert N. Lewis, then Instructor in Chemistry and, in 1945, was made a Full Professor of Chemistry. His present title is Professor of Chemistry in the College of Chemistry and Director of Chemistry in the Radiation Laboratory.

During the War Dr. Seaborg was on leave of absence from the University for work at the Metallurgical Laboratory of the University of Chicago on the Manhattan Project. Here he was primarily responsible for the development of the chemical separation procedures which were used in the manufacture of plutonium at Clinton, Tennessee, and Hanford, Washington.

Dr. Seaborg is a member of the Advisory Committee to the Atomic Energy Commission by appointment by President Truman (Continued on page 2, column 1)

South Gate Press. The
5/11/47
More Honors
For Dr. Seaborg

Professor Glenn T. Seaborg, 34, of the University of California, co-discoverer of plutonium, man-made source of atomic energy, has been awarded the \$1,000 American Chemical Society Prize in Pure Chemistry for 1947. It was announced recently at a dinner of Alpha Chi Sigma, national chemical fraternity, award sponsor, of which he is a Councilor-at-Large. Professor Seaborg is the son of a South Gate pioneer family and attended grammar school here. The prize, given annually to encourage fundamental studies by young chemists working in North America, goes to Professor Seaborg for his leadership in the field of nuclear chemistry and his direction of the research program leading to the discovery and isolation of plutonium and also americium and curium, elements 95 and 96.

The scientist is a member of the nine-man general advisory committee appointed by President Truman to assist the United States Atomic Energy Commission, and was chosen "Chemist of the Year" in a nation-wide poll of chemists and chemical engineers. He received the 1945 Distinguished Service Award of the Chicago Junior Association of Commerce, and last year was chosen Harrison Howe Lecturer by the Rochester Section of the American Chemical Society. Recently he was appointed consultant in nuclear physics at the General Electric Company research laboratory in Schenectady, N. Y.

Presentation of the 1947 award to Professor Seaborg will be made by the American Chemical Society's fall meeting in New York.

MAY 2 1947

Greatness—SAN FRANCISCO CHRONICLE

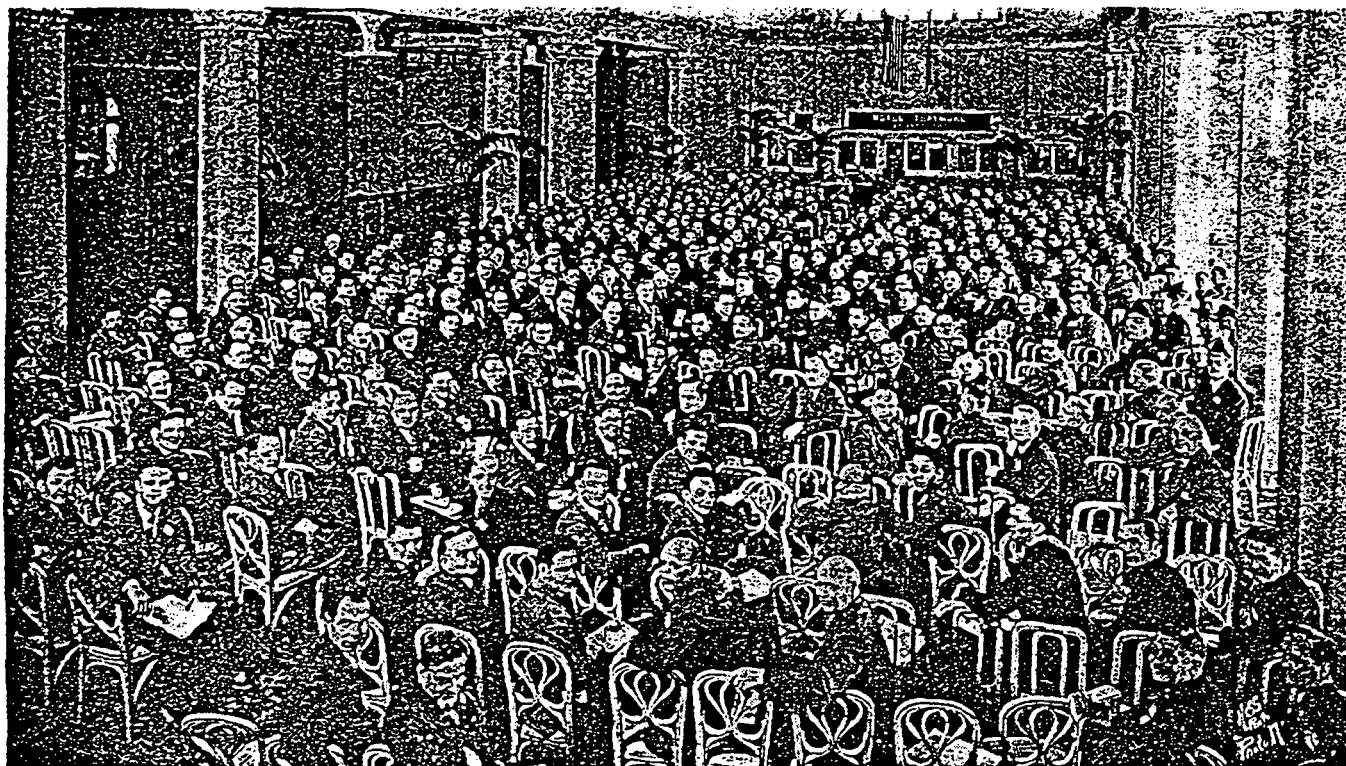
With more than 40,000 students enrolled on the several campuses, the University of California can lay claim to being the second largest university in America in point of population. Only New York University, with 47,000, is larger, while Columbia, once largest of all, trails with 37,699, according to the last available census.

Size, of course, is not an index of greatness, so we are more impressed with another gauge that indicates the Big C has become one of the world's great centers of culture and scientific achievement. We speak of the ever-growing list of national and international honors won by staff members of the university.

Nine University of California faculty members this year won Guggenheim fellowships for projects in physiology, chemistry, physics, music, history and other fields. No other university has won so many of these coveted fellowships. Last week, Prof. Glenn T. Seaborg won the American Chemical Society's \$1000 prize and

was named "leading chemist of the year." He was also appointed by President Truman to the advisory committee of the Atomic Energy Commission. Another Californian on the committee is Prof. J. Robert Oppenheimer, wartime director of the Los Alamos atomic bomb plant.

Honors in the field of nuclear energy continue to flow into the Berkeley campus. Prof. Ernest O. Lawrence, Nobel prize winner and inventor of the cyclotron, received the honorary Doctor of Science degree from McGill University, Montreal; Dr. Leonard Loeb was chosen to deliver the 38th annual Kelvin Lecture at the Institution of Electrical Engineers, London (the second American to win that honor); Prof. Robert S. Stone won the Radiological Society of North America's gold medal—the first awarded since 1941—for "unusual service to the science of radiology;" Professors Stone, Lawrence and Dean Stafford L. Warren of the Medical School received Distinguished Service Medals from Maj. Gen. Leslie Groves for their work with the Manhattan District.



VOLUME 25, NO. 18 MAY 5, 1947



Chem. and Eng. News 5/5/47
 Alpha Chi Sigma dinner. C. J. Krister, Du Pont Co.; Merle Griffin, Shell Chemical Corp.; G. T. Seaborg, Univ. of Calif., ACS award winner; A. W. Chapman, Celotex Co.; W. S. Calcott, Du Pont, toastmaster; ACS president-elect C. A. Thomas, Monsanto.

Chem. and Eng. News 5/5/47

Glenn T. Seaborg, professor of chemistry at the University of California, has been named as consultant in nucleonics to the General Electric research laboratory at Schenectady, N. Y. Among other scientists who played important roles in atomic bomb development who are now GE consultants are E. O. Lawrence, University of California; H. A. Bethe and Philip Morrison, Cornell; Enrico Fermi, University of Chicago; and E. P. Wigner, director of the Clinton Laboratories at Oak Ridge.

About People 5/5/47

Glenn T. Seaborg, University of California, was the fifth speaker in the Wayne University chemical lecture series Monday evening, March 24. Dr. Seaborg, co-discoverer of plutonium and the transuranic elements, americium and curium, is a member of the 9-man general advisory committee appointed by President Truman to assist the Atomic Energy Commission (*Science*, December 20, 1946).

Charles A. Thomas, vice president of Monsanto Chemical Co. and president-elect of the AMERICAN CHEMICAL SOCIETY, spoke at the Alpha Chi Sigma dinner at the Chelsea on Tuesday evening. Discussing the peacetime applications of atomic energy, Dr. Thomas pointed out that the design of knowledge resembles the growth of a jigsaw puzzle with different segments advancing at different rates. This is particularly true of the present stage in the development of atomic energy. For their work on the atomic bomb and for their work following and to follow on atomic energy, however, the chemist and the chemical engineer have not been accorded their proper roles, said Dr. Thomas.

As to when results in this field may be expected, Dr. Thomas stated that the first benefits are already here in the form of radioisotopes, which can be produced in enormous quantities. As compared with 270 stable isotopes, there are about 450 known radioisotopes of which over 50 are being distributed for research purposes. While there is quite a supply of the more important radioisotopes, there is still a shortage of carbon 14, stated Dr. Thomas, who then discussed the potential uses of radioisotopes in such fields as the mechanisms of organic reactions, polymerization, surface coatings, textile lubricants, and unit operations in chemical engineering.

Here is an opportunity for the American chemist and chemical engineer that exists nowhere else in the world, concluded Dr. Thomas. He urged that we become a nation trained in the use of atomic tools.

Alpha Chi Sigma, sponsor of the \$1,000 Award in Pure Chemistry, honored another well-known scientist in the field of nuclear physics at the meeting when it was announced by Merle Griffin of the Shell Chemical Co. that the award this year would go to Glenn T. Seaborg, co-discoverer of plutonium. Seaborg, who rose from an instructorship at the University of California to full professorship in six

years, was awarded the prize for his leadership in the field of nuclear chemistry and his direction of the research program leading to the discovery and isolation of plutonium, and of americium (95) and curium (96). The award will be presented at the fall meeting of the Society in New York.
CHEM. AND ENGR. NEWS 8/1/44

Officers and Councilors of
THE CALIFORNIA ALUMNI ASSOCIATION
1947-48

President: Stanley N. Barnes '22, San Marino
First Vice-president: William M. Hale '14, San Francisco
Second Vice-president: Mrs. Beatrice Ward Challiss '23, Los Angeles
Treasurer: James H. Corley '26, Berkeley
Executive Manager: Robert Sibley '03, Berkeley

Councilors, terms expiring June, 1947:

John S. Chapman '27, Los Angeles; Clinton W. Evans '12, Berkeley; Joseph P. Loeb '05, Los Angeles; Walter Ratcliff '03, Berkeley; Emery Stone '32, Berkeley.

Councilors, terms expiring June, 1948:

Sidney Anderson '21, Santa Barbara; Harold Breakenridge '30, Oakland; Mrs. Alice Kohlberg Geballe '11, San Francisco; Carroll G. Grunsky '20, Stockton; Miss Ruth Hardison '20, Santa Paula; E. C. Lipman '14, San Francisco; James Mills '17, Hamilton City; Albert M. Paul '09, Fresno; E. J. Power '15, Anaheim; Jack Symes '21, San Francisco; Maynard Toll '27, Los Angeles; M. E. Van Sant '23, Los Angeles.

Councilors, terms expiring June, 1949:

Mrs. Ella Barrows Hagar '19, Berkeley; I. W. Hellman '20, San Francisco; Stanley McCaffrey '38, Oakland; O. Cort Majors '21, San Francisco; Mrs. Helen Reef Maynard '15, San Jose; Sumner Mering '20, Sacramento; Robert Mulvaney '24, Walnut Creek; William H. Park '28, Berkeley; Edward G. Sewell '19, Taft; Fred Stripp '32, Berkeley; B. A. Schwartz '11, Clarksburg; Harold Tower (D.D.S. '34), Petaluma.

Councilors, serving in ex-officio capacity:

James W. Archer '30, chairman, South Border district; Floyd A. Blower '36, chairman, Southern California Regional Council; Victor E. Breeden '12, chairman, Bay Region district; Dr. William C. Deamer '23, president, Medical chapter; Don Lang '48, president, Associated Students of the University of California; Gus Olson, Jr., '38, president, Davis chapter; Mrs. Mary O. Scroggs '22, president, Nurses chapter; Dr. George E. Steninger '25, president, Dental chapter; Jean C. Witter '16, past president.

BERK. GAZETTE 6/20/47
**2000 U. C.
Alumni to
Meet Here**

More than 2000 alumni of the University of California will gather in Faculty Glade on the Berkeley campus at noon tomorrow for the annual Commencement luncheon honoring the senior class.

President Robert Gordon Sproul will head the list of speakers, paying homage to Monroe E. Deutsch, retiring provost of the University. Dr. Deutsch will introduce other members of the faculty who are closing their careers.

Bartley C. Crum, San Francisco attorney who wrote "Behind the Silken Curtain" following an investigation of the Palestine situation, will speak on "Current Trends in World Justice." Crum is a member of the class of 1922.

A report on recent nuclear research by the University Radiation Laboratory will be made by Prof. Glenn Seaborg, co-discoverer of plutonium and "Chemist of the Year."

ALUMNI ORGANIZATION

Alumni who are observing the 50th anniversary of their graduation will be inducted into a new organization of Senior Alumni with ceremonies directed by Charles Craig, president of the class of 1897, and C. C. Young, former governor of California.

Appearing on the program as student representatives will be Donald Paterson, president of the senior class; Jean O'Brien, class vice-president; Edward Welch, ASUC vice-president and newly appointed director of general activities; and Marilyn Smith, ASUC vice-president.

Judge Stanley N. Barnes, president of the California Alumni Association, will conduct the program and give the annual report of the association. Executive Manager Robert Sibley will introduce distinguished guests.

OPERN. GAZETTE 42/47

UC Alumni At Annual Luncheon

Charging that continuance of the Truman Doctrine as applied to Turkey and Greece will lead to economic ruin of the United States, Bartley C. Crum, San Francisco attorney, addressed the annual Commencement luncheon of the California Alumni Association this noon in Faculty Glade. "Continued doling out of American funds without any plan to recreate the wealth thus distributed, will only result in continued confusion in the balance of the world, and end in the eventual impoverishment of the United States itself," he charged.

He asserted that unless the United States, Russia and other nations surrender their sovereign power to make war, peace cannot be achieved. "If we are to have peace and world justice in 1947," he declared, "we must limit the sovereign right of all nations to make war at will . . . This means that both the Soviet Union and the United States must limit their veto power."

PAID TRIBUTE

President Robert Gordon Sproul paid tribute at the luncheon to Dr. Monroe E. Deitsch, retiring vice-president and provost. In turn, homage to members of the University faculty who will retire within the next six months was paid by Dr. Deutsch at the luncheon. He pointed out that it is the faculty which makes a university, rather than the students, or even the administrators, as important as they may be.

"It is the faculty," he declared, "who do that for which the University exists—teaching and research and who seek out those who are to carry the torch in due time."

PROFS. INTRODUCED

Dr. Deutsch introduced the following who will retire. Ernest B. Babcock, professor of genetics in the Agricultural Experiment Station; James T. Barrett, professor of plant pathology and plant pathologist in the Experiment Station; John W. Gregg, professor of landscape design and University consultant in landscape design; Dudley O. McGovney, professor of law; Walter Mulford, professor of forestry and first dean of the School of Forestry; Frederick Logan Paxon, Margaret Byrne, Professor of American History and chairman of the Department of History; George A. Rice, professor of education and director of supervised teaching; Dwight E. Watkins, associate professor of public speaking. Dr. Deutsch also mentioned Prof. Alfred Solomon of the French department, who passed away recently and who had planned to retire in the near future after having served on the faculty for 45 years.

A report on recent nuclear research in the University Radiation Laboratory was made by Prof. Glenn Seaborg, co-discoverer of plutonium.

DASLY, C. L. 7/3/47
Atomic Medicine

Now Being Taught To Doctors in S.F.

A group of the University's most brilliant atomic scientists are going over to the San Francisco campus for the next two weeks to initiate a class of doctors into the mysteries of nuclear physics.

This will be the first opportunity for medical men to study in a classroom the advances that have been made in the medical applications of atomic physics over the last few years.

Each scientist will lecture on the field in which he has done the most research.

Luis W. Alvarez, professor of physics, will lecture on the acceleration of particles to very high energies. Alvarez is currently building the linear accelerator, an atom smasher so powerful that it may make the cyclotron obsolete.

Wendell M. Latimer, dean of the college of chemistry, will lecture on the future applications of atomic energy.

Edwin McMillan, professor of physics, will tell the medical men about the chain reacting pile which is the key to the production of atomic energy. McMillan has devised the new principle under which, by applying frequency modulation to the operation of the cyclotron, it is possible to produce energies twice as high as ever before.

Also included in the galaxy of famous scientists will be Glenn T. Seaborg, young professor of chemistry, who was named last year by the American Chemical society as the "chemist of the year."

The course began Monday and will continue on through July 18.

The San Francisco News

SAN FRANCISCO, FRIDAY, JULY 11, 1947

Scientists at Stanford Told Nuclear Facts

Physical Society Group Given Report on Latest Developments

By George Dusheck

The 280th meeting of the American Physical Society which opened today at Stanford University heard a report on experiments with the latest in equipment for the study of nuclear physics.

Five sessions of the society were scheduled for today and tomorrow, including a special symposium on underwater sound to correlate results of wartime naval research.

Two University of California scientists—Glen T. Seaborg, chemist, and Isadore Perlman, physicist—reported on preliminary results of transmutation experiments with the great new 184-inch cyclotron at UC's Radiation Laboratory in Berkeley.

10 TIMES HIGHER

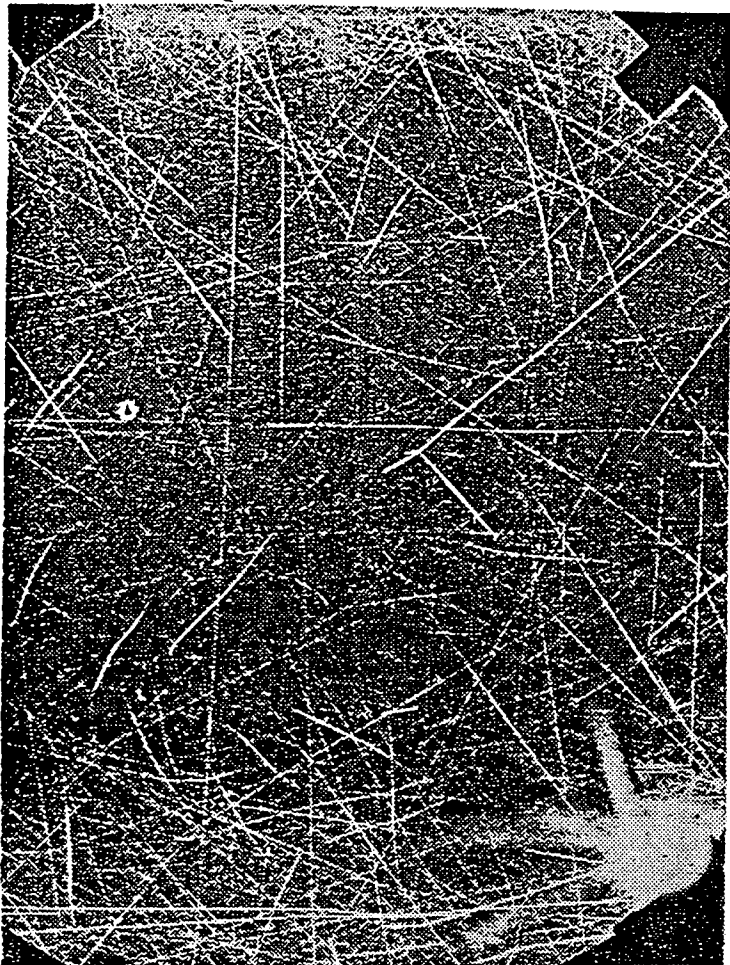
Energies from the new machine are 10 times higher than with previous cyclotrons, and the impact disintegrates the nuclear targets with corresponding dramatic power. For example arsenic-75 was bombarded deuterons of up to 200 million electron volts of energy. As many as 21 particles were blasted from the nuclei of the sample bombarded, compared with only two or three removed particles in the old cyclotron.

In addition, the disintegrated nuclei yield many new radioactive isotopes, some never previously produced. As many as 10 or 15 of these have been noted after a single bombardment, Drs. Seaborg and Perlman reported.

NEW HUNDRED

They predicted as many as a hundred such new isotopes will be produced by the giant cyclotron, more even than are produced by the explosions of atomic bombs. The total number of radioactive isotopes produced by bombardment in the new cyclotron—including both new and

(Turn to Page 7, Column 2.)



CLOUD CHAMBER—Rare photo of breakdown of atomic nuclei displayed today at Stanford University science meeting by Dr. Wilson Powell, University of California. It shows nuclei disintegrating under impact of 100 million electron volt neutrons in the UC cyclotron. The five-pointed "stars," similar to cosmic ray phenomena, represent most complete man-caused disintegration of atom yet achieved.

Two UC Scientists Report Results of Cyclotron Tests

(Concluded From Page 1)

known—has reached as many as 30. The nuclear reactions are exceedingly complex: For example, when arsenic was, on one occasion, bombarded with alpha particles of 400 M.E.V., one of the end products was chlorine, 16 steps down the periodic table.

Previously the steps down or up have been only one or two at a time, and could be accurately predicted.

Dr. Wilson Powell, a UC cosmic ray researcher, displayed photographs of the disintegration of atomic nuclei, made by passing a 100 M.E.V. neutron beam from the cyclotron through a cloud-chamber apparatus.

5-PRONG STAR

Some of the photographs showed a five-pronged "star" emerging from a central point. Each point

4, FRIDAY, JULY 11, 1947

The elements which are thus created are radioactive and are of immense value in the diagnosis and treatment of such unconquered diseases as cancer. On the basis of these reports, it is evident that the new cyclotron will produce more such radio-

active isotopes than even the

tend to "decay" upward from the stable isotope of the element. For example, the atoms of iodine resulting from fission include iodine 131 and higher isotopes, while the stable isotope of this element is iodine of atomic weight 127.

Large numbers of these lighter weight isotopes are now produced by the new cyclotron which were impossible to "manufacture" previously. It was pointed out that they will be extremely useful in "tracer studies" where suitable radioactive isotopes of common elements do not exist.

It may well be many years before the extreme complexity of the new atomic processes resulting from the heavy bombardments will be fully understood. Most of the isotopes produced have still not been completely identified.

One of the more remarkable facts of the new experiments is the fact that, for the first time, transmutation of elements has jumped more than

To scientists this big jump opens up exciting vistas of alternative routes by which the original element came to form chlorine. It may, for all the scientists know, have jumped all over the periodic chart and appeared in the form of a dozen different elements in the process.

The former method of transmutation, by comparison, amounted to chipping away at the original nucleus by ejecting one or two neutrons at a time. By this method the production routes could almost always be exactly predicted.

All sorts of decay combinations are now possible, primarily as a result of the new departure in knocking out a larger number of particles at a time. Whether any of these fissions will result in energies stronger than that which provides the explosive power for the atom bomb, is still not predictable.

However, Doctors Seaborg and

New Atom Finds Bared

Discoveries Open Fresh Fields for Cyclotron Research

Atomic energy scientists working with the 4000-ton cyclotron at the University of California radiation laboratory have made such strides recently that they now will have to work out an entire new set of principles for predicting the phenomena they are discovering.

That was the report today of eight of the scientists before the first sessions of a two-day meeting of the American Physical Society at Stanford University, in which 200 physicists are participating.

They said that the new atomic processes found in a new high energy range are much more complex than anything ever observed in previous nuclear disintegrations.

EXAMPLE CITED

As an example, Drs. Glenn T. Seaborg and Isadore Perlman cited the fact that as many as 30 different radioactive isotopes may be produced in one bombardment by the cyclotron. Some of the isotopes are known and some of them are new.

All, said the two scientists in their report, have different rates of decay, making identification extremely complex.

In one case, they said, arsenic was bombarded with alpha particles, and one of the transmutation products was chlorine, which is 16 elements down the periodic table. In bombardments with other cyclotrons, transmutation products did not go farther down than one or two elements above or below the bombarded element.

The big jump down the periodic table, said Drs. Seaborg and Perlman, opens up alternative routes by which the original element might have reached chlorine. Previously, ejecting one or two neutrons from a nucleus, the production routes could almost always be predicted.

POSSIBLE COMBINATIONS

However, all sorts of decay combinations now are possible, the report continued, primarily as a result of the new departure in knocking out several charged particles. With the possible combinations of atomic reactions this poses, the men said, nuclear scientists will have to work out a new set of principles to predict the phenomena to be observed.

Drs. Seaborg and Perlman also reported the fission of uranium with these ultra-high energy deuterons and alpha particles. A wider spread of fission products than occurs in the slow neutron fission of the atomic bomb was observed. Also, uranium bombs were split more symmetrically than in slow neutron fission, with the bulk of the fission products being in the center of the periodic table.

Other subjects under discussion at the Stanford conference pose questions as to whether there is a possible new source of destructive atomic energy release in the mysterious cosmic rays which continuously bombard earth from the heavens, and what is developing from the studies on sound and reverberation in the ocean depths.

Atomic energy papers were scheduled from Drs. Seaborg and Perlman and Drs. B. B. Cunningham, H. H. Hopkins, Manfred Lindner, D. R. Miller, P. R. O'Connor and R. C. Thompson.

FIRST PHOTOS

Today's meetings also included the showing for the first time of photographs of the most complete disintegrations of atomic nuclei ever achieved by man.

The research was done under the auspices of the Atomic Energy Commission, by Dr. Wilson Powell, associate professor of physics at Berkeley, and described at the meeting by Dr. Robert Thornton, professor of physics.

UC 'Big Gun' Splinters Nuclei

New Cyclotron Vastly Widens Study Range

A dazzling array of atomic research developments, stemming from the enormous energies unleashed by the new giant cyclotron at the University of California, was reported today to the Palo Alto meeting of the Pacific Coast Section of the American Physical Society.

The new developments, marking one of the first major steps of nuclear scientists beyond the basic knowledge which made possible the atomic bomb, are the result of a pure research program sponsored by the Atomic Energy Commission in collaboration with the University's Radiation Laboratory and College of Chemistry.

Bombardments by the giant machine with 200 million electron volt deuterons and 400 million electron volt alpha particles (in each case about 10 times more energetic than have been produced by any other atom-smashers) resulted in: 1) blasting from the atomic nucleus 22 and possibly as many as 30 particles, where two or three was the pre-war record; 2) the prospect that well over a hundred new radioactive isotopes of the common elements will be produced; 3) entirely new nuclear processes of greater complexity than the relatively simple patterns of the lower energy range.

RESEARCH HERE

The research was done here at Berkeley by Drs. B. B. Cunningham, H. H. Hopkins, Manfred Lindner, D. R. Miller, P. R. O'Conner, Isadore Perlman, Glenn T. Seaborg, and R. C. Thompson. Dr. Seaborg and Dr. Perlman reported the following details to the American Physical Society Meeting.

1. Twenty-two particles, both neutrons and particles of positive charge, have been blasted out of the atomic nucleus in a single great disintegration. The usual number knocked out by other atom-smashers has been two or three particles. With the older, 225-ton cyclotron at the University of California scientists recently had knocked four particles from the nucleus, but this was so new it had not been published.

Drs. Seaborg and Perlman stated that more particles, perhaps 30, probably have been removed from the nucleus, but no attempt to verify this has been made yet. In an experiment demonstrating the removal of some 21 particles, the arsenic isotope having an atomic weight of 75 was bombarded with deuterons. One of the transmutation products was radioactive cobalt of an atomic weight of 54.

MANY NEW ISOTOPES

2. A host of new radioactive isotopes of common elements, which could not be produced in lower energy atom-smashers or in the atomic piles, will result from the high energy bombardments. The scientists estimated that a hundred or more such isotopes, more than were found in the products of atomic fission, will result from future detailed studies of bombardments.

As many as 10 or 15 new, previously unknown radioactive isotopes have been noted after a single bombardment, though there has not been time to make the detail studies necessary for their identification.

An entirely new "spectrum" of radioisotopes is within reach as a result of the high energy bombardments. Drs. Seaborg and Perlman explained that fission results in nuclei which are overbalanced with neutrons, and such nuclei tend to decay upward from the stable isotope of the element. For example, the atoms of iodine resulting from fission include iodine 131 and higher isotopes, while the iodine of atomic weight 127.

NEW HEAVYWEIGHTS

With lower energies it had been impossible to produce more than a few isotopes of lighter weight than the stable isotope. But a large number are formed in the new high energy bombardment because the transmutation products tend to be overbalanced with protons of the nucleus after the removal of many neutrons. Stabilization of this overbalanced nucleus requires that some of the protons be converted into neutrons, and thus in losing charge it decays downward.

An example of a light radioactive isotope already identified is iron 52, which was produced from the bombardment of copper, four

steps up the atomic scale. No isotope of iron had previously been produced which was lighter than the stable isotope of this element iron 54.

Drs. Seaborg and Perlman said it is probable that many new isotopes will be found which will be useful in tracer studies, and this might be significant where suitable radioactive isotopes of common elements do not exist.

3. The scientists said that these and other new atomic processes found in the new high energy range are much more complex than anything ever observed in previous nuclear disintegrations.

As an example, he cited the fact that as many as 30 different radioactive isotopes may be produced in one bombardment, some of which are known, some of which are new. All of these have different rates of decay, and identification is extremely complex.

In one case arsenic was bombarded with alpha particles, and one of the transmutation products was chlorine, 16 elements down the periodic table. In bombardments with other cyclotrons transmutation products did not go farther than one or two elements above or below the bombarded element. The big jump down the periodic table opens up alternative routes by which the original element might have reached the chlorine. Previously, ejecting one or two neutrons from a nucleus, the production routes could almost always be predicted.

WIDER POSSIBILITIES

All sorts of decay combinations are now possible, primarily as a result of the new departure in knocking out several charged particles. With the possible combinations of atomic reactions this poses, nuclear scientists will have to work out a new set of principles to predict the phenomena to be observed, the scientists said.

Drs. Seaborg and Perlman also reported the fission of uranium with these ultra-high energy deuterons and alpha particles. A wider spread of fission products than occurs in the slow neutron fission of the atomic bomb was observed. Also, uranium atoms were split more symmetrically than in slow neutron fission, with the bulk of the fission products being in the center of the periodic table.

7/11/47

U. C. Cyclotron Produces Replicas Of Cosmic Rays

By JAMES G. CHESNUTT

Staff-Bulletin Staff Writer

STANFORD UNIVERSITY, July 11.—Tremendous new frontiers of understanding and application of atomic energy, opened by the new giant cyclotron at the University of California, were described here for the first time today.

Most spectacular, if not the most important in end results, was the announcement of the production by cyclotron bombardment of the first man-made replica of cosmic rays—the mysterious atom-smashing force from interstellar space.

The new developments made possible by the 4,000-ton cyclotron, an amazing array of contributions to man's further understanding of the energy locked in the atom, were paraded before America's topflight nuclear physicists, attending the 280th meet-

ing of the American Physical Society here.

Approximately 200 scientists from all parts of the nation are represented at the two-day session.

Utilizing the enormous energies unleashed by the new cyclotron, the group of University of California researchers reporting at the meeting found themselves with a tool dwarfing in potentialities the smaller cyclotron and other earlier equipment which furnished the basic knowledge for the atomic bomb.

By contrast, the older 235-ton UC cyclotron was a figurative magnifying glass with which to read atomic fundamentals, whereas the huge new instrument is a highpowered microscope barring unexplored new fields.

Bombardments by the new cyclotron with 200 million electron volt deuterons and 400 million electron volt alpha particles—in each case some ten times greater energy than any previously developed in other atom-smashers—have produced the following results, the researchers announced:

1. Twenty-two separate particles of energy (perhaps as high as 30) have been blasted out of the atomic nucleus in a single great disintegration, where the previous record high was four and the usual number two or three particles.

2. A whole host of new radioactive isotopes of common elements, of great potential value in medical and biological research, was forecast. As many as 15 previously unknown radioactive isotopes were noted after a single bombardment.

3. Observation of entirely new nuclear processes, still not understood, and much more complex than the relatively simple patterns of the lower energy range.

4. "Leap-frog" action in transmutation of one element to another under particle bombardment. In bombardment of arsenic with alpha particles, one of the transmutation products was the far-lighter chlorine, 16 elements removed from arsenic on the periodic table.

Berkeley Research

The discoveries were the result of a pure research program conducted at Berkeley and sponsored by the Atomic Energy Commission in collaboration with the university's Radiation Laboratory and College of Chemistry.

The work was done by Drs. B. B. Cunningham, H. H. Hopkins, Manfred Lindner, D. R. Miller, F. R. O'Conner, Isadore Perlman, Glenn T. Seaborg and R. C. Thompson. Their results were reported to the meeting by Drs. Seaborg and Perlman.

Separate but related experiments by Dr. Wilson Powell with the big cyclotron produced visual evidence of the most complete disintegrations of atomic nuclei ever achieved by man.

Photographs of these disintegrations, resulting from the passage of the 100 million electron volt neutron beam through a "cloud chamber" in the cyclotron, were exhibited at the meeting. This research was described by Dr. Robert Thornton, professor of physics at the university.

Central 'Star'

The photographs, actually the pictures of the course of the energy particles in droplets of water within the 16-inch cloud chamber, show a five-pointed "star"

emerging from a central point. Each prong, it was explained, represents a piece of disintegrated atomic nucleus, broken up by collision of a fast-moving neutron and the nucleus.

The "stars" are similar to those found in low-energy cosmic radiation—such as have been photographed in bomber-borne cloud chambers at high altitudes over the desert experimental station at Inyokern.

Those photographed at Berkeley are the first produced by cyclotron bombardment and are, in effect, low-energy cosmic rays, the researchers said.

In contrast to the cyclotron's 100 million electron volt neutron beam, cosmic ray particles of several billion electron volts are common. Dr. Robert B. Brode, University of California physicist and a pioneer in the high-altitude work at Inyokern, says there is evidence of isolated instances of 1,000,000 billion electron volt cosmic ray particles.

Like Gentle Rain

But while cosmic rays are of much higher energy, they are present in relatively few numbers. Their effect is as a gentle rain, compared to the fire-nozzle intensity of the lower-energy cyclotron beam.

Dr. Brode, reporting on his cosmic ray research, is one of the three speakers giving invited papers at today's sessions. The invited paper of the morning session was by Dr. Felix Bloch, noted Stanford nuclear physicist, on

Cosmic Ray Replicas Produced

Cyclotron Forms Cosmic Ray

STANFORD UNIVERSITY, Calif.,

July 11 (UP).—The University of California's new 4,000-ton cyclotron has produced the first man-made replicas of the mysterious interstellar cosmic rays, the force from space of which so little is known, America's leading nuclear physicists were told Friday.

Dr. Glenn T. Seaborg, one of the Berkeley, Calif., university's leading atomic scientists, told the 280th meeting of the American Physical Society, Pacific Coast section, here that with the huge new atom-smasher the university had probed further than ever before into the unknown.

For the first time in history, the immense range of the cosmic and the invisible subatomic world had been brought within the reach of man, made visible by photographs taken in cloud chambers while the cyclotron was bombarding the atom.

Results of Experiment.

The UC cyclotron, put into operation Nov. 1, 1946, after six years of construction hampered by the war, is believed to be the world's largest atom-smasher. Russia is known to be working with similar cyclotrons.

More than 200 scientists from all parts of the United States, meeting here in a two-day session, heard Dr. Seaborg and Dr. Isadore Perlman describe the results of experiments—pure research—conducted by eight UC physicists, including themselves.

Seaborg said the bombardments by the giant machine with 200,000,000 electron volt deuterons and 400,000,000 electron volt alpha particles—ten times more energetic than produced by any other known atom smasher—had resulted in:

1. Blasting from the atomic nucleus of twenty-two and possibly as many as thirty particles compared to a prewar record of two or three with the outdated 235-ton University of California cyclotron No. 2.

2. The prospect that well over 100 new radio-active isotopes of the common elements—valuable in bio-

logical and medical research—will be produced.

3. Entirely new nuclear processes of greater complexity than the relatively simple patterns of the lower energy range.

Transmutation of Elements.

4. The leap-frog transmutation of one element to another during bombardment—the answer to the mystery sought by man since the Middle Ages when alchemists vainly tried to turn lead into gold.

Bombardment of arsenic with alpha particles, for instance, brought a transmuted product of far lighter chlorine, the scientists were told.

Photographs of the most complete disintegration of atomic nuclei yet achieved by man in atomic experiments were exhibited.

The camera eye, focused on a cloud chamber similar to those used in stratosphere research by the navy air arm to trap and record cosmic rays, caught the disintegrations resulting from passage of a 100,000,000 electron volt neutron beam.

In one corner of the photograph is a five-pronged star emerging from a central point, each finger representing the splitting atomic nucleus.

OAKLAND POST-ENQUIRER 7/11/47

U. C. Subatom 'Bullets' Open New Era

By G. B. Lal

(Science Editor, The American Weekly)

A newer atomic energy era has dawned today.

America's nuclear scientists—who have brought atomic energy out of the atom's nucleus (heart) in a practical way—have taken a major step forward since they gave the world-shaking atom bomb.

At the University of California's

Radiation Laboratory, on the Berkeley campus, under the leadership of Prof. Ernest O. Lawrence, Nobel prize winner, his colleagues, Drs. G. T. Seaborg, Isadore Perlman and others, have developed a new kind of atomic bombardment.

The scientists have attacked the atom with subatomic bullets produced by the world's most powerful cyclotron, the nearly 5000-ton (184-inch) atom whirling and smashing machine, and the results have been amazing, although not unexpected by top-notch scientists.

From the use of subatomic bullets of 20 to 40 million electron-volt energies (these are neutron particles—cores of heavy hydrogen, and alpha, or helium atomic cores) generated by the highest power older cyclotron, scientists have advanced to producing bullets of 200 to 400 million volt energies.

With 10 times more energetic atomic artillery, the conquest of the atom's hidden energy, locked up in the nuclear center, has progressed 10 times faster and deeper. The effect of this is seen in two ways: A whole crowd of neutrons and protons (of which the atom is built) pour out; also, a whole series of new elements are formed.

When the atoms of arsenic (the poisonous mineral) were bombarded with 200-million volt deuteron (heavy hydrogen) particles, there came out of these attacked, excited atoms, newly created atoms of such elements as manganese, iron, cobalt, nickel, copper, zinc and so forth, although the detection of each element is not yet decisive.

Such wholesale transmutation

→ FROM PAGE ONE

U. C. Subatomic 'Bullets' Launch Scientific Era

of one element into other elements has not been known before; it is as though the attacked atom gave birth to multiple babies.

The elements which are thus "created," born in the cyclotron, are radio-active; that is, unlike ordinary stable elements, they give out radiations as does radium. This makes them of utmost importance. For example, by bombardment of copper a new radio-isotope of iron (atomic weight 52, compared with ordinary iron of weight 54) was generated.

In medicine — diagnosis and treatment of unconquered diseases, such as cancer—these radiating substances are of immense use. Industrial research is aided enormously by them.

By the super-energetic bombardment 100 or more new radiating elements (radioactive isotopes), such as no other cyclotrons or even the atomic energy piles can generate, will become available.

MORE PARTICLES

The usual number of subatomic particles (neutrons, protons and helium cores of alpha particles) obtained by bombardment of atoms are two to three; by the new atomic bombardment 22 or even 30 such particles are released from the nucleus. Whether such abundant neutrons will ever be made to start a chain reaction, the basis of the atom bomb reaction, no one yet knows. But the scientists are dreaming big dreams.

Dr. Wilson M. Powell, another of three Berkeley scientists, completely smashed the oxygen atomic nucleus, leaving nothing but neutrons, protons and deu-

trons, thus causing the sort of atomic disintegration which occurs only in cosmic ray reactions with the molecules of the air. A new atomic age has come.

These researches have been sponsored by the Atomic Energy Commission.

Research has been going on by Dr. Perlman, Dr. Seaborg, Dr. B. B. Cunningham, Dr. H. H. Hopkins, Dr. Manfred Lindner, Dr. D. R. Miller, Dr. P. R. O'Conner and Dr. R. C. Thompson.

city of California atomic scientists here.

The graphic evidence of such disintegrations, made at the 4000-ton atom smashing cyclotron here, were of the passage of 100,000,000 electron volt neutron beams through a "cloud chamber."

Such research, done under auspices of the Atomic Energy Commission, was described in Palo Alto today at a meeting of the Pacific Coast Section of the American Physical Society by Dr. Robert Thornton, physics professor in Berkeley. The work in preparing the photos was accomplished by Dr. Wilson Powell, also a physicist.

The photos show a five-pronged "star" emerging from a central point, each prong of which represents a portion of disintegrated atomic nucleus. The "breaking up" is caused by a fast moving neutron colliding with the nucleus.

The "cloud chamber" into which the camera lens was injected was 16 inches in diameter.

J. C. Cyclotron Blasts Way to Best Atom Gain Since Bomb

By JOHN F. ALLEN

Subatomic bullets from the University of California's giant new cyclotron have blasted the way for nuclear scientists into a new era of atomic energy.

Bombardments by the huge, 4,000-ton atom smasher carry more than ten times the energy produced by other cyclotrons and early experiments have provided the first major steps in nuclear research since the basic knowledge which made possible the atomic bomb.

Out of this tremendous power, man for the first time has emulated the heavens, reproducing nature's own atom smasher, the cosmic ray.

Results of these first to be announced experiments were revealed yesterday at Stanford University before a meeting of the American Physical Society. The major findings, which came as a surprising revelation even to an audience of 200 of the country's top physicists, were:

- 1—The bombardments have blasted from the atomic nucleus twenty-two and possibly as many as thirty particles, where two or three was the previous record.
- 2—Potentially available are more than 100 new radioactive isotopes, invaluable weapons for both medicine and experimental science.
- 3—Available for nuclear study are atomic processes far more complex than anything observed in previ-

U. C. Cyclotron Blasts in Greatest Atomic Advance Since Bomb



DR. G. T. SEABORG
Presents Report
—San Francisco Examiner photo

ous low energy nuclear disintegrations.

4—Scientists have succeeded in creating man-made cosmic rays—miniature replicas of nature's mysterious and super-powerful force. The cosmic "stars" are similar to those found in low energy cosmic radiation and are the first produced by cyclotron bombardment.

GREAT PROGRESS.

The research was done at the university's radiation laboratory, on a hill overlooking the Berkeley campus, under the direction of Dr. Ernest O. Lawrence, Nobel prize winner. Presenting the reports at Stanford were two of his chief aides, Drs. G. T. Seaborg and Isadore Perlman.

Back of the new findings is a machine which generates potencies of 200 million electron volt neutrons (cores of heavy hydrogen) and 400 million electron volt alpha particles.

Highest energies ever reached previously, on the old, 250 ton cyclotron were 20 and 40 million electron volts.

With atom artillery ten times as potent, the conquest of the atom's hidden energy, locked up

in the nuclear center, has progressed ten times faster and deeper.

The effect of this has been shown in two ways: a whole crowd of neutrons and protons (of which the atom is built up) pour out; a whole series of new elements are formed.

22 PARTICLES.

A 200 million electron volt blast, for instance, directed at arsenic created newly formed atoms of such elements as manganese, iron, cobalt, nickel, copper and zinc, as well as many more, still not certainly detected.

Doctors Seaborg and Perlman said that at least twenty-two particles have been blasted out in a single great disintegration and they estimate that perhaps a total of thirty have been produced.

Such wholesale transmutation of one element into other elements has not been known before. It is as though the attacked atom gave birth to multiple babies.

Hurl Steel Beyond Gravity

Secret Explosive Can Fling Up Satellites

Science has developed a new explosive powerful enough to hurl steel cones beyond the pull of gravity where they will float around the earth forever, an astronomer said today.

The explosive, named Penolite, has been a closely guarded military secret since its development seven years ago, according to Dr. Fritz Zwicky, astronomer at Mt. Wilson Observatory.

In a report to the Astronomical Society of the Pacific, Zwicky said scientists already have attempted to toss projectiles high enough to become artificial satellites like the moon.

The attempts failed but new experiments are being planned, he said.

If the tests succeed they might mark a milestone in the development of inter-planetary communication, Zwicky said.

Penolite is reputed to be about

one-third more powerful than TNT and capable of propelling one of the cones at about six miles per second.

Zwicky's disclosure came on the heels of an announcement that the University of California's new 4000-ton cyclotron has blasted as many as 22 and possibly 30 particles from an atomic nucleus and produced new atoms not found in nature.

10-FOLD FORCE

The nuclei are bombarded by hydrogen or helium nuclei with a force 10 times greater than has ever before been achieved, Dr. Glenn T. Seaborg, one of the University's leading nuclear scientists, said.

The new cyclotron, in operation at Berkeley since November of last year, has actually "smashed"

atomic nuclei for the first time, Seaborg told a meeting of the American Physical Society at Palo Alto.

Before the war, the University's old 225-ton cyclotron had been able only to "chip" rather than completely smash the atom.

For the first time, Seaborg said, the way has been opened with the new cyclotron to break down the more stable atoms into particles of an entirely different element.

For instance, he said, arsenic has been changed into chlorine by nuclear bombardment.

San Francisco Chronicle

THE CITY'S ONLY HOME-OWNED NEWSPAPER

SATURDAY, JULY 12, 1947

New U. C. Cyclotron Most Powerful Machine Made

By MILTON SILVERMAN
Science Writer, The Chronicle

STANFORD UNIVERSITY, July 11—The new atom-smashing cyclotron now operating at the University of California was revealed here today to be the most terribly devastating machine ever created by man.

In some respects, it packs a bigger punch than does the atomic bomb.

Hurling atomic particles with energies up to 400,000,000 electron-volts, the 4000-ton giant on the Berkeley campus has already blasted at least 22 particles out of an atomic nucleus—where 2 or 3 was the pre-war record—and produced scores of new atoms never before known to man.

Among them are two new forms of radium created by smashing uranium.

These new developments were reported here today before the Pacific Coast section of the American Physical Society. Most of the work, it was announced, was conducted under the sponsorship of the Atomic Energy Commission. It was described by Drs. Glenn T. Seaborg and Isadore Perlman as spokesmen for a large team of scientists including Drs. B. E. Cunningham, H. H. Hopkins, Manfred Lindner, D. R. Miller, P. R. O'Conner, and R. C. Thompson.

The new cyclotron consists essentially of a huge hollow "pill-box" 184 inches in diameter, which lies between a pair of powerful magnets.

Inside the pillbox, atomic particles—nuclei of heavy hydrogen or helium atoms—are whirled about in gradually widening circles. Everytime they go halfway round, they are given an added electrical "kick." When they are finally turned loose on their targets, the heavy hydrogen nuclei have energies of 200,000,000 electron-volts and the helium nuclei get up to 400,000,000 electron-volts.

This energy, it was claimed, is roughly 10 times greater than has ever been achieved before.

Before the war, the biggest cyclotron was a 100-inch, 225-ton machine, also at the University of California. When it was used to bombard atoms, it "chipped" rather than actually "smashed" their nuclei.

But this chipping was dramatic enough at the time. It transmuted one chemical element into another by knocking one, two or occasionally three units of weight off of its nucleus. Sometimes the transmutation worked the other way, with one or two extra units added to the atomic nucleus.

The new 4000-ton cyclotron, however, can do more than chip. It has knocked 21 charges off in one bombardment, and may have clipped as many as 30.

In one experiment, atoms of arsenic—with an atomic weight of 75—were chopped down to atoms of cobalt, with a weight of 54.

"It's like changing a tower or a building," one scientist said. "With the old cyclotron, which was pretty

good in its way, we could knock two or three floors off a 50-story building, or maybe add a floor or two. But with the new cyclotron, we can knock that 50-story building into a flock of four-room bungalows, with a lot of nails and shingles left over."

How these new massive transmutations actually take place is still to be investigated.

Among the debris of this atom smashing is a host of new compounds, most of them also awaiting investigation and identification. Some of them, however, have already been studied and found to be radio-active substances which are totally new to science.

Radio-active atoms are those which gradually disintegrate to form

something else, and at the same time produce streams of energy. About 450 such radio-active forms of the 96 known chemical elements had previously been reported. Work with the new cyclotron is expected to add about 100 new radio-active substances.

Some of these, it was claimed, may find important jobs in future biological and medical research.

As one result of this new high-powered atom smashing, other University of California scientists displayed photographs showing the most complete disintegrations of an atomic nucleus ever achieved by a man-made machine. One photograph shows a five-pronged "star" emerging from a central point—the location of an atom which was struck by a speeding atomic bullet.

Each prong of the star represents the path of one fragment of the disintegrated atomic nucleus.

Such "stars" have been found in special photographs of low-energy cosmic rays striking atoms in the earth's upper atmosphere. They have never been obtained before with a cyclotron.

With a total speed of more than seven miles per second, he suggested, the "moon" would be able to get so far beyond the pull of gravity that it would stay there.

(For a story on attempts to launch "artificial moons" into orbits circling the earth 200 to 600 miles away and for a picture of an atom being smashed into five fragments see Page 3.)

Smithereens

As atom-smashing goes, the uranium bomb is a comparatively gentle affair. Fissioning the uranium atom is roughly comparable to cracking a ripe coconut in half with a well-placed tap: the atom splits neatly into two pieces (lighter atoms) and two or three almost infinitesimal particles (neutrons) that fly off like sparks. Atom smashers believe that they will eventually do much better than that.

When & if the atom really splits to pieces, it will be more like an exploding electric light bulb—smashed to smithereens. Last week some determined U.S. atom smashers, the cyclotron group at the University of California, coolly reported that the smithereenizing of the atom is now well on its way. They announced that they had smashed some atoms into 22 to 30 pieces.

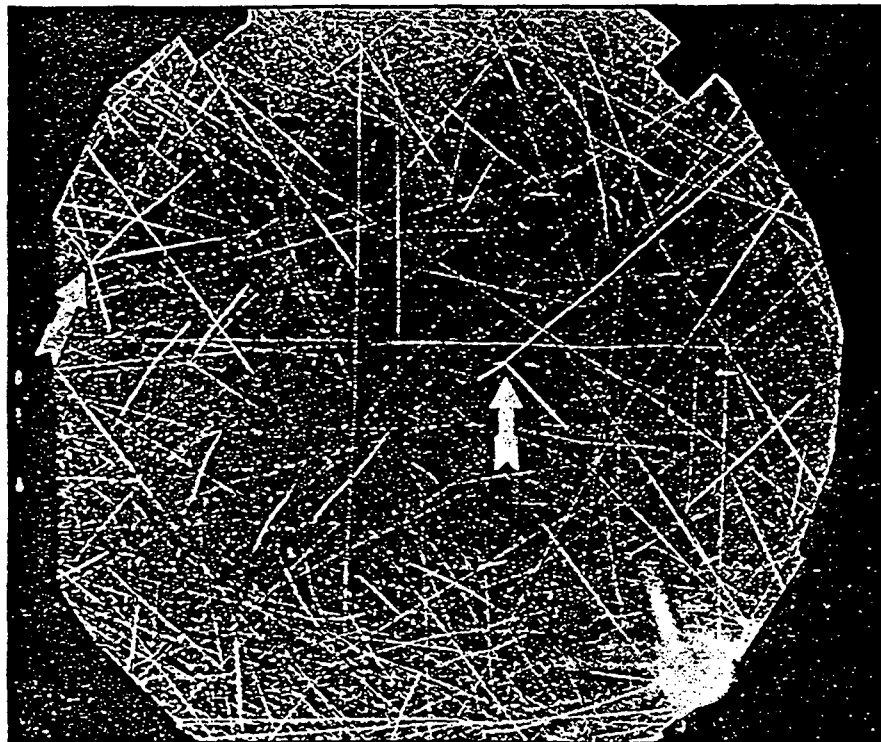
Successful Wollop. This feat was accomplished by Cal's fantastic new 184-inch cyclotron, which packs the most powerful wollop ever achieved by man. Firing relatively heavy atomic bullets—deuterons (heavy hydrogen nuclei) and alpha particles (helium nuclei)—with a force of 200 million to 400 million electron volts, the cyclotron has almost ten times the power of the most potent cyclotron previously known (also at Cal).* At an American Physical Society meeting at Stanford last week, Physicists Glenn T. Seaborg and Isadore Perlman made the first report on what they and their California teammates, who work under the sponsorship of the U.S. Atomic Energy Commission, had accomplished.

Successful Debris. Previous cyclotrons, they explained, had just chipped away at the atom, knocking off two or three small particles. But the 184-incher's bullets cause such havoc in atoms that researchers have so far been unable to sort out all the debris. Said one of the California scientists: "With the old cyclotron of 225 tons [60 inches], we could knock two or three floors off a 50-story building, or maybe add a floor or two. But with the new cyclotron, we can knock that 50-story building into a flock of four-room bungalows, with a lot of nails and shingles left over."

Sample smash: an arsenic atom (atomic weight: 75) had 21 particles knocked off by a single blow, and was reduced to radioactive cobalt (atomic weight: 54). When the new cyclotron bombarded an oxygen atom (atomic weight: 16) with neutrons, the light atom split into five pieces (*see cut*; the arrows point to the five-way split of the oxygen atom, the streaks indicate the path of atomic chips).

Upshot: California's atom smashers have thus far produced some 100 new isotopes* of atoms to add to the 450 previously known. Among them: two new forms of radium, and an iron isotope (atomic weight: 52) lighter than any iron ever before found. The physicists think that some of their new isotopes may be useful in medicine and research. But most of the isotopes, like the bombarded atom itself, are very unstable.

* General Electric's 100-million-volt betatron is not comparable, because it shoots much lighter particles (electrons).



SMASHED ATOMS
Result: a flock of four-room bungalows.

Giant Cyclotron Produces 22 Fragments from Single Nucleus

7/28/47

NUCLEAR disintegrations yielding 22 particles from a single atom and the formation of many new light isotopes were among the first results obtained in the giant 184-inch cyclotron at the University of California, according to reports of Berkeley scientists at a meeting of the American Physical Society at Stanford University, Palo Alto, Calif., July 11-12. The scientists reported results with the new cyclotron which weighs 4,000 tons and dwarfs the earlier Berkeley cyclotron (225 tons). Bombarding beams with energies 10 times greater than ever before achieved produce nuclear disintegration processes more complex than any heretofore encountered.

Glenn T. Seaborg, director of chemistry, radiation laboratory, and Isadore Perlman, associate professor, department of chemistry, University of California, described results of high energy bombardment, and Robert Thornton, University of California physicist, showed cloud chamber photographs of the most complete nuclear disintegrations yet obtained. Beams of deuterons and helium ions of approximately 200 and 400 mev., respectively, are produced in the giant cyclotron and were used in these investigations.

While the usual number of transmutation products formed in other accelerators has been two or three (four have recently been obtained in the 225-ton cyclotron in as yet unpublished work), 22 particles, including both neutrons and particles of positive charge, have been blasted out of the nucleus in a single disintegration in the giant cyclotron, and as many as 30 particles may be formed in one bombardment, some of which are known, some of which are new. Products with atomic numbers considerably lower than that of the target are produced in every case.

Transmutation products in other cyclotrons did not go farther than one or two elements above or below the bombarded element. But in one case in the giant cyclotron, arsenic was bombarded with alpha particles to form representatives of all elements from selenium to manganese as well as chlorine, 16 elements down the periodic table. The big jump down the table opens up alternative routes by which the original element might have reached chlorine. Previously, ejecting one or two neutrons from a nucleus, the production routes could almost always be predicted.

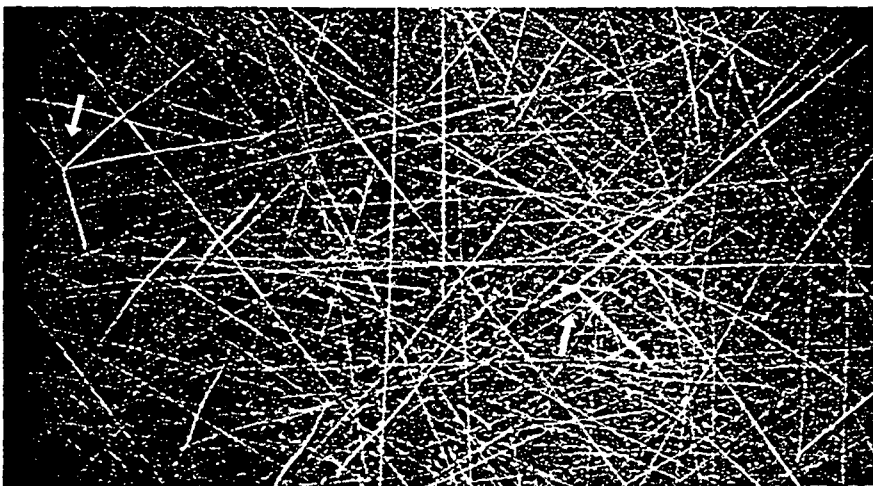
An entirely new spectrum of radioisotopes is within reach as a result of the high energy bombardments. Uranium fission results in nuclei which are overbalanced in neutrons, causing decay upward from the stable isotopes. As an example, iodine atoms from fission include I^{131} and higher isotopes while the stable isotope is I^{127} . With lower energy bombardments it had been possible to produce more than a few isotopes of lighter weight than the stable isotope, but a large number are formed in the new high energy bombardments because the transmutation products tend to be overbalanced with protons after the removal of so many neutrons. Stabilization of this overbalanced nucleus requires that some of the protons be converted into neutrons, thus decaying downward. For example, a new 8-hour iron positron emitter assigned to Fe^{52} was produced from bombardment of copper. It involved the loss of 4 units of charge and 13 units of mass from the original nucleus. No isotope of iron had previously been produced which was lighter than the stable isotope of this element, Fe^{54} . The scientists estimate that a hundred or more such isotopes will result from future studies of bombardment.

The new atomic processes found in the high energy range are much more complex than anything ever observed in previous nuclear disintegrations. Reactions of both multiple neutron ejection and multiple charged particle ejection have been observed to take place. Thus with deuterons on Sb^{121} and Sb^{123} both Cd^{107} and Cd^{115} were produced, below and above the stable isotopes of cadmium. Likewise with As^{76} cobalt activities tentatively assigned to Co^{55} or Co^{54} and Co^{61} were found.

All sorts of decay combinations are now possible, primarily as a result of the new departure in knocking out several charged particles. With the possible combinations of atomic reactions this poses, nuclear scientists will have to work out a new set of principles to predict the phenomena to be observed, the scientists said.

In another paper, the same authors reported the bombardment of uranium with 400-mev. helium ions. A wide range of activities was identified in both the heavy element region and in the region of the fission products. Representatives of the heavy isotopes were Ra^{223} , Ra^{224} , and an isotope of astatine (element 85), At^{211} . The uranium atoms were split more symmetrically with the fission product dis-

Cloud chamber photograph showing disintegrations of oxygen nuclei with 100-mev. neutrons. Left. A five-pronged "star." Right. A four-pronged "star." Heaviest tracks are alpha particles; light tracks are protons and electrons



EXTINCT ELEMENTS DISCOVERED
IN ATOMIC BOMB DEVELOPMENT

8/6/47

By SCIENCE SERVICE

BERKELEY, Calif., Aug. 7 -- A prehistoric family of heavy radioactive elements which may have occurred naturally in the earth's beginnings but now is extinct was unearthed during development of the atomic bomb.

This missing link in the periodic table was found with production of synthetic elements neptunium, americium and uranium 233. It includes the recently identified elements 85 and 87, explaining fully for first time the absence^{of}/these elements from nature.

Called the neptunium series because neptunium 237 is the longest-lived of the family, it is the missing one of our four series of heavy radioactive elements. The others are the uranium, thorium and actinium series.

Two parallel investigations are reported in the Physical Review just issued. One was headed by Dr. Glenn Seaborg, of the University of California, while he was at Chicago, with co-authors listed as Drs. French Hagemann, Leonard Katzin, of Argonne, Martin Studier, Chicago, and Albert Ghiorso, University of California. The second study was by Canada's Division of Atomic Energy.

One of the authors of the Canadian report was Dr. Alan Nunn May, who is now serving a 10-year sentence in Britain for revealing atomic research data to Soviet Russia. Other Canadian scientists reporting on the work were A.C. English, T.E. Cranshaw, P. Demers, J.A. Harvey, E.P. Hincks and J.V. Jelley.

The reason for the extinction of the newly-discovered series is the relatively short half-life of parent, neptunium, which is two million years. The age of earth is estimated at two billion years.

Neptunium, like other heavy radioactive elements, decays by alpha particles, until it reaches a stable isotope. It decays to uranium 233, the synthetic isotope made by bombardment of thorium, and then down through isotopes of radium, actinium, francium, astatine and polonium until it reaches stable bismuth 209. Americium, element No. 95, is an even more remote ancestor of series with half life only 500 years.

The other three series exist in nature because of the long half-lives of the parents, these being four and half billion years for uranium 238, fourteen billion years for thorium 232 and seven hundred million years for uranium 235. The latter isotope was not known when the actinium series^{was} named, but it is the actual parent.

00210

S.F. News 8/7/47
UC Scientists
'Find' Elements

S.F. EXAMINER 8/7/47
U. C. Cyclotron Determines
Fate of 2 Missing Elements

**Particles, Unknown for Two Billion Years,
Identified at Berkeley**

By HENRY PALM

The University of California cyclotron has probed backward two billion years in time to fill a gap in one of the fundamentals of science.

By duplicating the reactions of the earth's formation, the cyclotron has determined the fate of elements 85 and 87, heretofore missing from the periodic table of elements.

As a "time machine," the cyclotron has proved the two elements, now called astatine and francium, existed when the earth was formed two billion years ago but decayed into other elements.

76-YEAR SEARCH—

These findings have been announced by Dr. Glenn T. Seaborg and Dr. Albert Ghiorso of the university's cyclotron staff.

Their discoveries have ended a seventy-six year search for the missing elements.

The number of the elements in the table are determined by the number of protons in the nuclei, running from the lightest, hydrogen with one proton, on up through the heavier elements such as uranium.

The new elements form a new "series" in the periodic table, one

of four groups of heavy radioactive elements. The others are headed by uranium, thorium, and actinium.

This new group has been named the "neptunium series" because neptunium has the longest period of radioactivity of any of the members. Neptunium itself was first discovered in Berkeley and was the intermediate element in production of plutonium from uranium.

EXPLANATION—

Doctor Seaborg has explained that neptunium possibly existed in nature when the earth was formed, and as a result the other extinct elements 85 and 87 also were present.

Neptunium decays by each atom throwing off an alpha particle, which consists of two protons and two neutrons. Since neptunium has a weight of 237, the resulting element is uranium 233, which also is radioactive and throws off more alpha particles. Thus the element degenerates through types of radium, actinium, francium, astatine, and polonium, finally ending up as bismuth, which has a weight of 209 and is not radioactive.

**Two Radioactive
'Links' Discovered**

Two radioactive elements that existed two billion years ago were reported "re-discovered" in Berkeley today by cyclotronic bombardment.

Elements 85 and 87, the "missing link" in the periodic table of elements, have been created synthetically by cyclotron and atomic oven transmutation for the first time. The discoveries end a 76-year search for the key to one of the fundamental mysteries of science.

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ACCOUNTS FOR SERIES

Mr. Seaborg said the cyclotron discovery accounted for the missing fourth series of heavy radioactive elements in the periodic table, which has been named the "neptunium" series since it has the longest period of radioactivity of any of the other elements in the series.

The other series contain elements in the uranium, thorium and actinium groupings—all found previously in nature or in the laboratory.

Mr. Seaborg said the inability of scientists to find elements 85 and 87 had been one of science's mysteries since the table of elements was established in 1871. The table lists elements in the order of their atomic "weight," determined by the number of protons in the nuclei.

'FATHER' OF ELEMENTS

He explained that neptunium was the "father" of the series and of the two elements. Like all radioactive elements, they decayed at a fixed rate which in the course of millions of years wiped them out of existence, he said.

Actually, Mr. Seaborg said, there was an even more remote ancestor of the neptunium series—synthetic element 95, or americium 241, which was discovered by University of California scientists. But it decayed so rapidly, with a "half-life" of 500 years, that it quickly became extinct soon after the earth's beginning.

S.F. CALL-BULLETIN 8/7/47

Atom Study Finds 'Lost' Elements

University of California atom smashers have shared in the reproduction of a whole series of "lost" radioactive substances which probably existed on earth hundreds of millions of years ago, it was revealed today.

Two of the substances discovered, francium and astatine, have been fitted into notable blank spaces which have long existed in the conventional list of chemical elements. The spaces, scientists figured, should be occupied but they could find no substances with the correct specifications to fill the gaps.

All but three of the "lost" substances reproduced are strange forms of ordinary chemicals, either a little lighter or a little heavier than their conventional namesakes.

CHEMICAL FREAKS

Their odd weights make them radioactive and therefore comparatively short-lived, their spans of existence ranging from a few seconds to a few million years.

Of the three which are not chemical freaks, two are short-lived members of the conventional list of chemical elements and the other is just plain bismuth, a silver-colored metal sometimes used in medicine.

FITTED PATTERN

Two groups of researchers in parallel projects fitted the substances into a pattern.

One group was headed by Dr. Glenn T. Seaborg, University of California chemist and key researcher in production of the atom bomb. The other group worked in the Canadian National Research Council division of atomic energy. Results were reported in the Physical Review, a scientific periodical.

76-Year Search OAKLAND POST-ENQUIRER

U. C. Scientists Report Find of 'Lost Elements'

By Robert Prescott

BERKELEY, Aug. 7 (UP).—Two radioactive elements that existed 2,000,000,000 years ago were reported "re-discovered" today by cyclotronic bombardment.

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Research that went into discovery of the missing elements, carried out independently by two groups of scientists, was reported in the current issue of Physical Review.

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tunium" series since it has the longest period of radioactivity of any of the other elements in the series.

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BERKELEY GAZETTE 8/7/47

UC Men Help Solve Gaps in Atomic Table

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OAKLAND TRIBUNE 8/7/47

ATOMIC 'MISSING LINK' MYSTERY SOLVED AT U.C.

BERKELEY, Aug. 7.—Two University of California nuclear chemists, in collaboration with other atomic scientists, today solved the mystery of a long-puzzling "missing link" in atomic energy research by explaining why the neptunium series in the periodic table of elements no longer exists in nature.

This missing fourth series of heavy radio-active elements, all of them now extinct, includes elements 85 and 87, astatine and francium, identified only recently, and has been named "neptunium" because this element has the longest radioactivity period.

Answers to this problem of the "missing link" have been supplied by two groups of scientists, among them Drs. Glenn T. Seaborg and Albert Ghiorso of U.C.

SYNTHETIC PRODUCTION

The neptunium group, comparable to the uranium, thorium and actinium series, can only be made synthetically by cyclotron and atomic oven transmutations.

Dr. Seaborg lists the following facts in explaining the present non-existence of the series:

1—At the origin of the earth—an estimated two billion years ago—neptunium possibly occurred naturally, as did its "daughter" isotopes of the extinct series, but thereafter it decayed at a fixed rate.

2—As do the other heavy radioactive parents, uranium, thorium and actinium, Neptunium 237 decayed by the emission of alpha particles.

However, an atom of neptunium continues to emit alpha particles, at the same time skipping down the periodic table until it reaches a non-radioactive element and becomes stable.

RATE OF DECAY

3—Since the half-life (rate of decay) of Neptunium 237 is two million years, half the world supply decayed two million years following the earth's birth. In another two million years half of the remaining Neptunium 237 disappeared, and so on until this parent isotope and all its "daughters" became extinct.

Elements in the three radioactive series still extant have parents with longer or nearly as long half-lives as the age of the earth. Dr. Seaborg said one of them, Uranium 235, parent of the actinium series, has a half-life of 700 million years, long enough for it to occur naturally.

By the bombardment of thorium in the university's cyclotron, he related, the decay chain for the lower part of the series was studied with the aid of Uranium 233, first element to which Neptunium 237 decays in its trip to stability when it eventually becomes bismuth of isotopic number 209.

Working with Drs. Seaborg and Ghiorso under the auspices of the Manhattan District were Drs. French T. Hageman and Leonard I. Katzin of the Argonne National Laboratory, Chicago, and Dr. Martin H. Studier of the University of Chicago.

Actually, Seaborg said, there was an even more remote ancestor of the neptunium series—synthetic element 95, or Americium 241, which was discovered by University of California scientists. But it decayed so rapidly, with a "half-life" of 500 years, that it quickly became extinct soon after the earth's beginning.

Working with Seaborg and Ghiorso on the research were Dr. French T. Hageman and Dr. Leonard I. Katzin, of the Argonne National Laboratory, Chicago; and Dr. Martin H. Studier, of the University of Chicago.

The second parallel investigation was carried out in the Division of Atomic Energy of the National Search Council of Canada.

Discovery of Fourth Radioactive Series Announced by American and Canadian Scientists

8/10/47

THE discovery of the fourth radioactive series of elements, the $(4n + 1)$ series, has been announced in simultaneous communications by two research teams who reported results of parallel work conducted in American and Canadian radiochemical laboratories. The new series, called the actinium series from the name of its longest-lived member, does not occur in nature. A large portion of it was revealed from studies of the chain of decay products from U^{233} , which is obtained only in the cyclotron and from thorium in conjunction with the uranium pile (see "Atomic Fuel from Thorium," CHEM. ENG. NEWS, June 2, 1947, p. 1538). The communications were published in an August issue of the *Physical Review*.

The American work was done at the metallurgical laboratory, University of Chicago, by a group headed by Glenn T. Seaborg, who is now director of chemistry at the radiation laboratory and at the University of California, Berkeley. The other American authors are: French T. Hagegmann and Leonard I. Katzin of the Argonne National Laboratory, Chicago; Martin H. Studier of Chicago's Institute of Nuclear Studies; and Albert Ghiorso of the University of California.

The Canadian work was done at the Montreal Laboratory of the Division of Atomic Energy, National Research Council of Canada. The group, several members of which are now located at Chalk River, Ont., includes A. C. English, T. E. Cranshaw, P. Demers, J. A. Harvey, E. P. Hincks, J. V. Jelley, and A. N. May.

The naturally occurring radioactive elements comprise three series, two of them named from the longest-lived members. The thorium series starts with Th^{232} and is termed the $4n$ series because the atomic

weights of its members are evenly divisible by 4. This series terminates in Pb^{208} .

The uranium series starts with U^{238} and is termed the $(4n + 2)$ series. It includes U^{235} , thus accounting for two of the three naturally occurring isotopes of uranium. This series also includes Ra^{226} and ends with Pb^{206} .

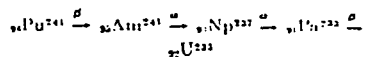
The $(4n + 3)$ series starts with U^{233} but is called the actinium series because at the time it was named the isotopes above actinium were not known. Protoactinium is the second member of this series, actinium the third. It ends on Pb^{207} .

At various times in the past, a fourth radioactive series, the $(4n + 1)$, was postulated, but none of its members were ever found in nature. The reason becomes apparent upon examining the half-lives of the members of the recently discovered series.

The age of the earth is generally considered to be about 2 billion years. Therefore, only radioactive elements with lives of this order of magnitude could be in existence at the present time unless they are derived from the decay of longer-lived antecedents. Thus the half-life of Th^{232} is 14 billion years, that of U^{238} is 4.5 billion years, and that of U^{235} is 0.7 billion years. But the half-life of Np^{237} , the longest-lived member of the $(4n + 1)$ series, is only 2.25 million years. So the period of the earth's existence is equivalent to 1,000 half-lives of this isotope. Therefore, the discovery of this series awaited the artificial production of its members in the cyclotron and pile. The work reported in the above communications emphasized the study of decay products from milligram amounts of U^{233} , which is an α -emitter with a half-life of 163,000 years. The $(4n + 1)$ series includes the two recently named elements,

francium (number 87) and astatine (number 85). Unlike the other three series, it ends on an isotope of bismuth. It also differs from the other series in not containing a rare gas, or emanation, member.

Upper members of this series include several of the recently discovered uranium elements which have been described previously. These upper members are:



"Collateral" members of this series include Th^{233} and U^{233} , which also have been described previously. The decay products of U^{233} trace a major part of the new series. They were announced in the above communications as follows:

SPECTER	TYPE OF RADIATION	HALF-LIFE
${}_{90}Th^{233}$	α	7,000 years
${}_{88}Ra^{229}$	β	14 days
${}_{86}Ac^{227}$	α	40 days
${}_{84}Fr^{223}$	α	5 min
${}_{82}At^{219}$	α	0.02 sec
${}_{80}Bi^{215}$	α (2%), β (98%)	46 min
${}_{78}Po^{211}$	α	$\approx 10^{-8}$ sec

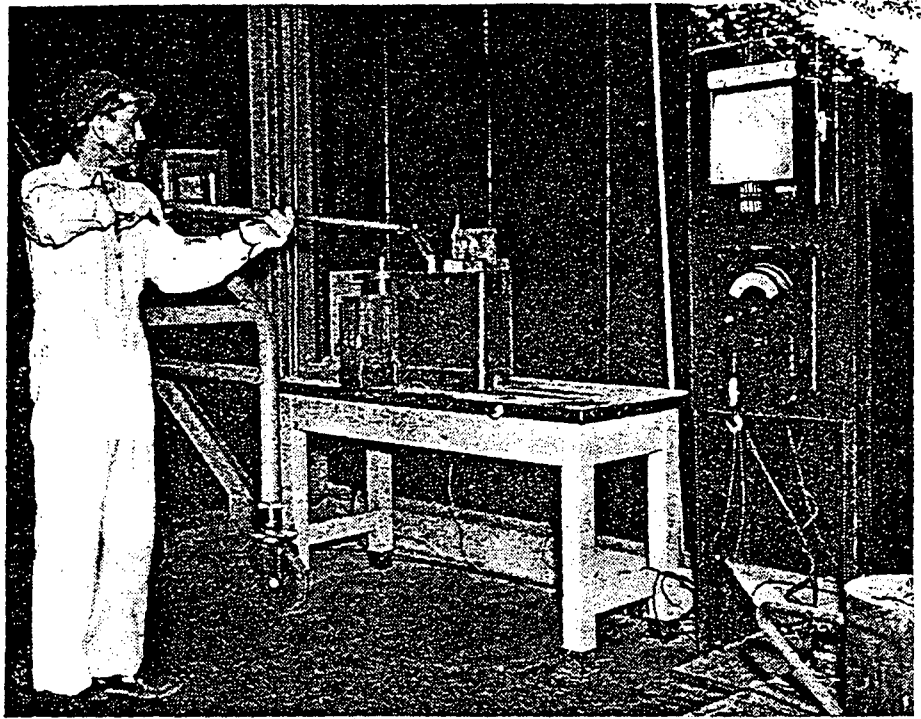
The remaining members of the series, both of which were previously known, are β -emitting Pb^{209} , which has a half-life of 3.3 hours, and stable Bi^{209} .

The 2% α -branching at Bi^{215} results in the formation of Tl^{209} , but the low activity of this isotope precluded measurement. It is postulated that it decays with β -emission to Pb^{209} .

The Canadian authors reported that the α -emitters of this series are found to lie on a good straight line in a Geiger-Nuttall plot, with the exception of Po^{213} which falls well below the line. This line lies between and is parallel to those representing the $4n$ and the $(4n + 3)$ series.

Aug 4/47

8/11/47



A radioisotope unit is checked for radiation before shipment

A Year of Radioisotopes

On Aug. 2, 1946, Dr. E. V. Cowdry, research director of the Barnard Free Skin and Cancer Hospital, St. Louis, received the first shipment of radioisotopes,* produced in the chain-reacting pile of the Clinton Laboratories at Oak Ridge, Tenn. It included a batch of radioactive carbon 14, the precious tagging agent by which researchers hope to trace the beginning stages of cancer (NEWSWEEK, Aug. 12, 1946).

Last week, on the first anniversary of this initial shipment, the Atomic Energy Commission in Washington made a full report on more than 1,000 shipments of these isotopes to 170 institutions and researchers in 92 locations in the United States.

In one short year, with the help of the pile-produced radioactive materials, which are cheaper and easier to make than the old-fashioned cyclotron products, tremendous progress has been achieved in the fields of medicine, biology, and industry. "It is certain that applications made thus far are just the beginning of what is going to become an extremely large and successful field of research," predicted Dr. Glenn T. Seaborg, brilliant University of California chemist.

Gold and Cobalt: Approximately 100 varieties of radioisotopes have been produced from some 60 elements at the Clinton Laboratories by its operator, the Monsanto Chemical Co. These include phosphorus, iron, sodium, potassium, mer-

cury, sulphur, gold, and carbon, all of which have proved their worth in scientific research.

These and other valuable substances were shipped from Oak Ridge in specially constructed containers ranging in weight from less than a pound to a ton. The isotopes were placed in a glass bottle, inserted in an airtight, stainless-steel cylinder. This in turn was placed inside a lead shield, protected by a strong wooden box. To determine the amount of radiation at the surface, the box was checked with a sensitive Geiger counter. If the radioactivity was above human tolerance, the material was repacked with a thicker lead shield.

While radioisotopes have been shipped more than 700,000 miles by air, some airlines, the report says, refuse to handle this strange new material. "They mistakingly fear the radioactivity will affect navigation instruments, such as radio and compass, or items of transport." This, the Clinton scientists claim, is not true. "Radiation intensity at the surface of an isotope container is approximately the same as that at the radium dial of the pilot's wrist watch."

Because of the exceptionally short half-lives* of most of these radioisotopes, shipment by air, rail, and fast truck is accomplished at amazing speed. But speed was not an essential factor in handling the year's heaviest shipment, a 23-gram unit of radioactive cobalt in a 1,600-pound radiation shield, made to Dr. L. F. Curtis of the

national Bureau of Standards, Washington, D. C. The cobalt isotope, which has a half-life of 5.3 years, is being used for calibrating radiation-measuring instruments.

The Magic Tracers: The most dramatic uses of radioactive materials have been made in medical schools and hospitals:

► At Vanderbilt University, Dr. Paul F. Hahn has found radiomanganese and radiogold "exceedingly useful" in the treatment of 108 patients with chronic leukemia, lymphoma, and Hodgkin's disease. Before the pile-produced isotopes were received, cyclotron-produced materials averaged \$92 a treatment. With pile-produced radiogold, the cost is only about \$6.

► At Tulane University, Dr. George E. Burch has tried out radioactive sodium to determine the cause of edema (massive swelling) in congestive heart failure. By checking the turnover of sodium in normal and diseased patients with these tracers, Burch has been able to recommend proper treatment—mercurial diuretics for eliminating excess sodium. This in turn has lessened the amount of water in the tissues.

► At Cedars of Lebanon Hospital, Los Angeles, Dr. Myron Prinzmetal has used radiophosphorus to compare the circulation of normal hearts with those suffering from coronary occlusion. He has also tried radioactive iodine on hyperthyroid patients who were too ill to make surgical treatment advisable.

Radioactive iron is being used by Dr. Carl V. Moore and his associates at the Washington University School of Medicine, St. Louis, in the study of anemia.

► At Memorial Hospital, New York, an in-

*Variations of common elements with the same chemical properties as the stable elements, but with different atomic weights and having the property of radioactivity.

*A half-life is the time required for half the atoms initially present to disintegrate—and hence the period of its effective maximum radioactivity. The half-life of radiogold is 2.7 days; radiophosphorus, 14 days; carbon 14, 5,000 years, and a special isotope of polonium, about one-millionth of a second.

tensive cancer program using radioisotopes is under way. The isotopes are incorporated in such drugs as sex hormones, nucleic acids, and adrenal cortical hormones. By localizing radiation in certain tissues, the Memorial scientists have learned new things about cancer cell production. "An enormous amount of fundamental work must be done before direct application to medical problems is made," Dr. Cornelius P. Rhoads, director of Memorial, emphasized.

Plants and Molds: "The usefulness of radioisotopes is limited only by the imagination of the user," said Dr. Orlin Bidulph of the State College of Washington, who has used radioactive iron and phosphorus to study the pathway and mechanism of their movements in plants.

Dr. George O. Burr and his group at the experiment station of the Hawaiian Sugar Planters' Association, Honolulu, have studied the production by plants of organic food such as sugar and carbohydrates with radioactive carbon 14 as the tracer.

At the National Institute of Health, Bethesda, Md., Dr. R. E. Dyer has found that radiosulphur can be biologically incorporated into crystalline penicillin when the mold drug is grown on a medium containing this substance. This will enable scientists to determine much more about penicillin and why it is able to combat disease. With radioactive penicillin, the drug can be traced through the patient's body.

The Institute of Health is also using radioactive phosphorus to tag bacteria in the study of the tuberculosis bacillus. While results have not been revealed, it is believed that the means by which the bacillus enters the human body, and the resulting action, may be determined by tracer technique.

Industry and Agriculture: One of the most interesting experiments with radioisotopes has been conducted on friction problems by Dr. John T. Burwell Jr. of the Massachusetts Institute of Technology. Special pile-irradiated steel bearings were sent to Dr. Burwell for applied research. Tests which have been made at M.I.T. have shown that the tracer method makes it possible to detect as little as one-hundred billionth of an ounce of metal which has been transferred from one surface to another by friction. This sensitivity is thousands of times greater than that of previous methods, whether microchemical, optical, or electrical.

This knowledge of what happens to metal during friction and wear may lead to important advances in treatment and composition of surfaces to reduce friction in all types of machinery.

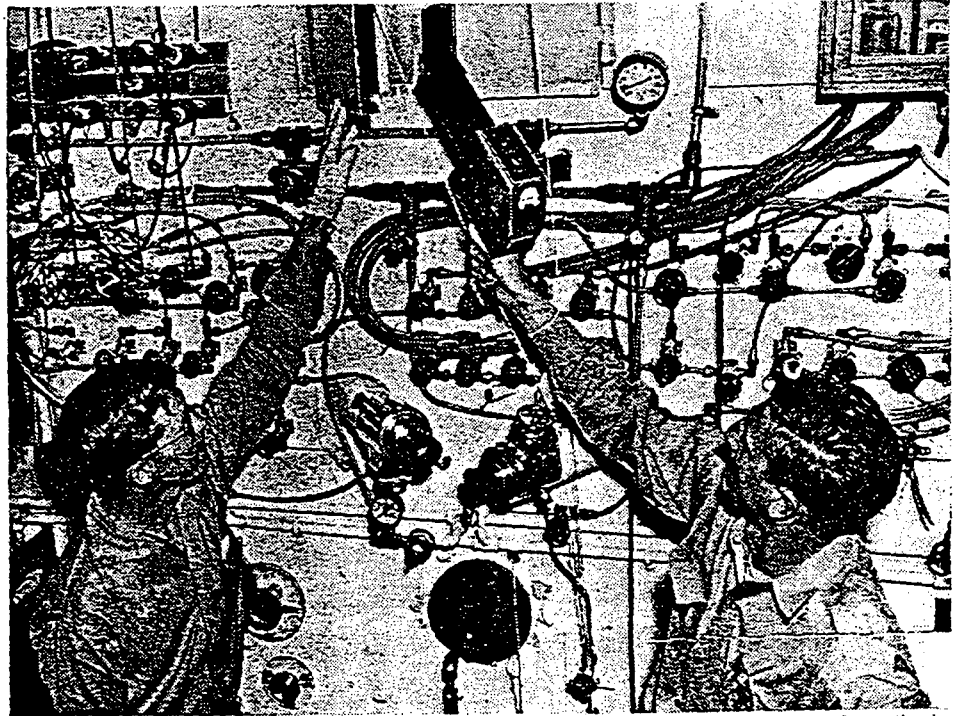
In agriculture, a number of significant experiments with radioisotopes have been undertaken:

► At the Bureau of Plant Industry, Department of Agriculture researchers are trying out radiophosphorus, calcium, potassium, and rubidium in the study of their behavior in the soil.

► At the Ohio Agricultural Experiment Station, Wooster, radiophosphorus and radiochlorine are helping to trace the movement, accumulation, utilization, and distribution of phosphate and chlorine in growing plants.

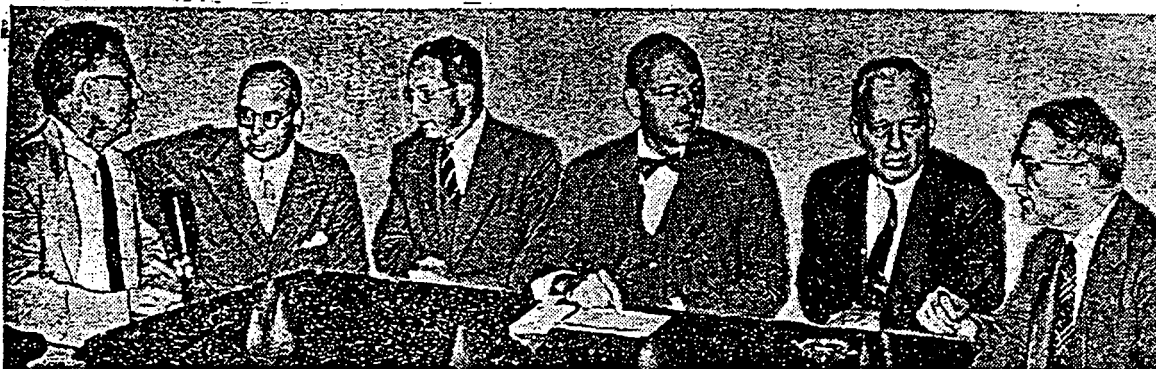
► At the University of California, radio-sulphur is the tool used for testing for direct evidence that sulphur as an insecticide or fungicide is physiologically injurious to citrus trees. Also at the University of California, studies are being made on the behavior of sodium bicarbonate, sodium acetate, and sodium lactate in the cow.

► A group of workers at the University of Florida are cooperating with the United States Agricultural Experiment Station in investigating the effects of small amounts of mineral, especially copper and cobalt, on the growth of pastures and on cattle grazing on these pastures.



Making remote-control observations of the atomic pile at Oak Ridge

August 11, 1947



DR. E. O. LAWRENCE, STRAUSS, BACHER, LILIENTHAL, PIKE, WAYMACK *S.F. CHRONICLE*
 America leads the world—but it can't afford to coast *5/12/47*

U. S. Atom Chiefs

Lilienthal Group at U. C., Talks About Its Aims, Responsibilities

By ALVIN D. HYMAN

Five men whose importance to the world cannot be exaggerated, lounged around a table in Berkeley yesterday and chatted about the thing that lends them their awful significance.

A lawyer, a college professor, a banker, an industrialist and a newspaper man, they have become, by appointment of President Truman, shepherds to the atomic age. The thing they talked about was atomic energy.

What they said, as members of the Atomic Energy Commission, had something of comfort for the people of the United States, but more of warning and challenge. It boils down to this:

America leads the world in the field of atomic energy, but it can't long do so by coasting.

The lawyer, David Lilienthal, chairman of the commission, put it into words. They were measured, carefully considered words, which he chose to reply to a question without quite answering it because it had to do with military matter and national security.

U. S. PRE-EMINENCE

Previously, he had declined to speculate on the ability of this Nation, now, to repulse any attack which might be made against it. He had said: "I think you ought to excuse me." He pondered awhile, and then said:

"The fact is that this commission considers it to be its duty, and is determined to accomplish the goal, that this country should be pre-eminent in the field of atomic energy—and if at all possible, to widen its present leadership."

Asked if he considers the commission has thus far succeeded in its determination, he said: "Yes."

He added: "But it will take a lot of hard work to stay there."

Lilienthal and his fellow commissioners talked informally and in general chattily, but it was obvious that their solemn responsibility dictated their conversation.

For instance, Lilienthal, who received his appointment only after one of the bitterest political battles in recent history, refused to remember that battle or to discuss more recent attempts to discredit the commission.

NO POLITICS

"There has been no political interference with this commission," he said. "I don't think the people would stand for it. I know we wouldn't. Which is a good thing—if politics ever comes into this thing, we might as well give up."

Besides Lilienthal, members of the commission are: Dr. Robert F. Bacher, nuclear physicist of Cornell University; Lewis L. Strauss, New York investment banker; Sumner T. Pike, New York industrialist, and William W. Waymack, editor of the Des Moines, Iowa, Register.

For three days they have been at the University of California for part of a series of conferences with directors and chief technicians at all the plants and laboratories which make up the Nation's \$2,500,000,000 investment in atomic energy. Four of them left late yesterday for the Hanford "plutonium factory" at Washington. Strauss returned to New York.

Lilienthal opened yesterday's discussion by paying the highest tribute to the University of California and its historic role in the atomic energy program. He mentioned Dr. Ernest O. Lawrence, Gilbert Lewis, Oppenheimer, Urey and Seaborg; he recalled the invention of the cyclotron and the discovery of plutonium on the Berkeley campus, and he urged:

"Bear in mind that great things are going on here now—discoveries on the way which may well be far more important than the discovery of gold in California a hundred years ago."

ATOMIC POWER

He brushed aside possibilities of imminent use of atomic energy for power purposes and denied that any preoccupation with military needs had slowed down "benign" development of atomic energy. He said:

"The only disappointment that is felt is due to a dashing of hopes that should not have been put forward in the first place—hopes of those who said atomic power is just around the corner."

Lilienthal said the development of atomic weapons is "paramount" in the atomic energy program as it now stands. He referred to the last semiannual report of the commission which revealed the establishment of proving grounds in the Pacific to test such weapons. Beyond that, he declined comment.

He and Commissioner Pike emphasized that a prime need of the program is adequate personnel, trained scientists, young men who can take over when the famous scientists of today are gone. As for money:

"We have \$500,000,000 for the year. If we need more to attain our objective, we won't hesitate to ask for it. I am confident Congress will provide it," Lilienthal said.

DAILY CALIFORNIAN
among the atoms . . .

The mystery of the missing radioactive series has finally been solved. Glenn T. Seaborg, professor of chemistry and "chemist of the year" for 1946, reports that he has found it.

The situation is that there are supposed to be at least four series of radioactive elements in the periodic table of chemical elements. One of the first discovered was the uranium series. This one started with the element uranium, which gave off radiations until it decomposed into radium which in turn finally decayed into lead—where the series ended.

The reason that it took so long to discover this new series is that most of the chemical elements in it have been long extinct. It wasn't until scientists began working on the atom bomb that they managed to create the parent element, neptunium.

The way Seaborg tells the story of the life and death of the fourth series of radioactive elements, it happened like this: When the earth started out some two billion years ago, all the members of this series did occur naturally. The neptunium, however, only lasted about four million years until it all decomposed into elements lower down on the atomic scale.

Steps on the scale include types of radium, actinium, francium, astatine, polonium and finally bismuth 209. Astatine and francium have also been extinct these many years but can be made in the cyclotron or in atomic ovens.

You need weep no longer mother—Glen N. Davis, assistant professor of truck crops has produced a tearless (almost) onion.

And that isn't all, Davis reports. "It

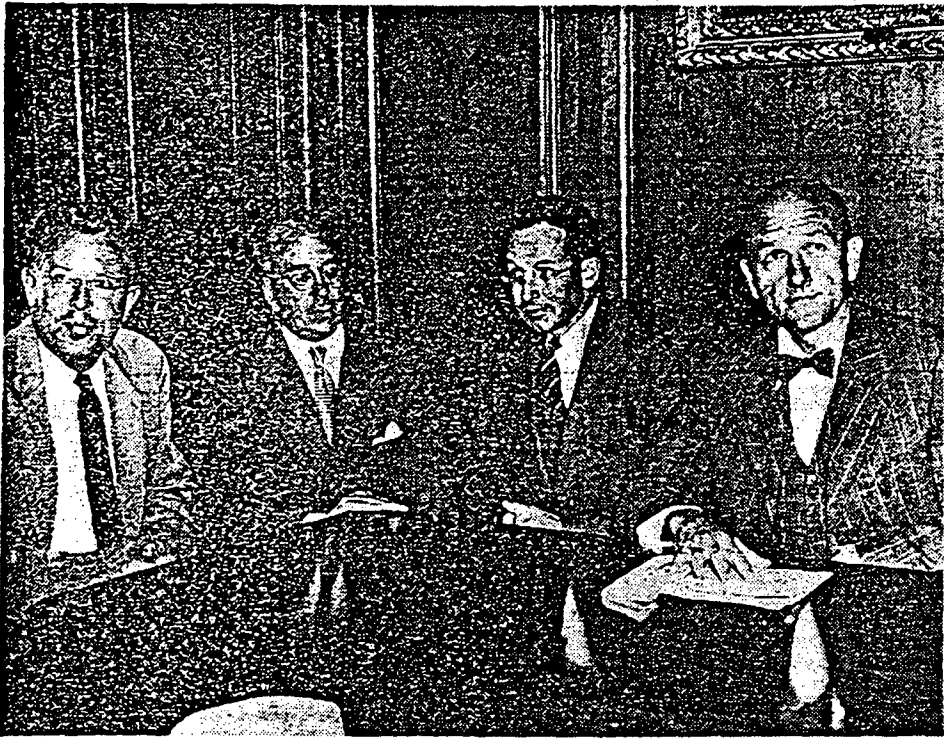
is exceedingly mild, has an unusually sweet flavor, and is especially good for eating raw," he says.

When pressed for an explanation of the onion, Davis explained how the sharp flavor of the onion is due to a certain volatile sulphur compound. This compound also causes tears to flow. In this new onion, this sulphur compound is all but eliminated.

. . .

To prepare the main course, you first take a quantity of altered Monterey pine sawdust. This is screened to remove very coarse wood chunks, bark, etc. and then sifted to remove fine, dust-like particles.

This is the new diet worked by the late S. F. Light, professor of zoology and Frances M. Wessner, graduate student in zoology, for feeding and raising termites, as described in the latest edition of "Science." Just thought you might be interested in case you had any termites around your house that you wanted to feed.



Members of the U. S. Atomic Energy Commission conferred with Dr. Ernest O. Lawrence, left, cyclotron inventor and other University of California nuclear physicists yesterday afternoon. Shown with Dr. Lawrence, left to right, are Lewis L. Strauss, Dr. Robert F. Bacher and David Lilienthal, chairman of the commission. Other members present were Sumner T. Pike and William W. Waymack. The commission was accompanied by G. L. Belsley, assistant to the general manager and director of organization and personnel.

Atom Leadership Aim Told by Lilienthal Here

By BETTY TURNER

Primary aim of the U. S. Atomic Energy Commission is to make certain the pre-eminence of this country in the production of atomic weapons, and if possible to widen its present leadership. This was the statement of David Lilienthal, chairman of the Commission, during a conference at the University of California yesterday afternoon. The paramount function of atomic research, he averred, is national security, adding that practical uses of atomic fission of the elements of nature, is not yet "just around the corner."

Accompanying Lilienthal on his West Coast trip, which will include a visit to the Hanford, Wash., and Los Alamos, N. M., atomic bomb factories, are four other members of the Commission. They are Dr. Robert F. Bacher, Cornell University nuclear physicist; Sumner T. Pike, New York industrialist; Lewis L. Strauss, New York investment banker and William W. Waymack, editor of the Des Moines, Ia., Register.

Lilienthal lauded the University of California for its pioneering in the field of atomic science, listing a "galaxy of great names"—Ernest Lawrence, inventor of the cyclotron, J. Robert Oppenheimer, Harold Urey, Glen Seaborg, Robert McMillan and John Lawrence. "Bear in mind," he said "That great things are going on here now—imminent discoveries which may well be far more important than the discovery of gold in California 100 years ago."

Lilienthal declined to divulge what the discoveries were, but Dr. Lawrence said that the investigations on the Berkeley campus were

mainly concerned with fundamental research. Dr. Lawrence said that interesting new facts are being probed bearing on fundamentals in the higher energy range. Lilienthal was emphatic in his

assurance that "there has been no political interference with the Atomic Energy Commission. He said that while the commission controls the supply of fissionable materials, there is no limitation whatever on fundamental research. On the contrary, he pointed out a diversity of fundamental research is encouraged and most of the operations for the Atomic Energy Commission are done by commercial concerns.

Lilienthal called attention to the great need for the training of young chemists and physicists to take over in the field of atomic science in the future. There will be a constantly increasing demand he said, for nuclear physicists as new discoveries concerning the nature of the elements continue to unfold.

among the atoms . . .

with Jack Bik

No one seemed to notice, but for three days this week the Atomic Energy commission has been inspecting the campus.

Under the leadership of Chairman David Lilienthal, members of the commission have been conferring with directors and chief technicians at the plants and laboratories around campus and on the hill.

Claiming to be on a kind of a vacation, Lilienthal wouldn't say very much, but he had high praise for the part the University played in the development of atomic energy. He mentioned in particular professors Ernest O. Lawrence, Gilbert Lewis, J. Robert Oppenheimer and Glenn T. Seaborg.

"Great things are going on here," he said, "discoveries on the way which may well be far more important than the discovery of gold in California a hundred years ago."

LACONIA, N. H.
CITIZEN

AUG 21 1947

8/24/47

A Woman's New York

BY ALICE HUGHES

(Life May Be Longer. But Burdens No Lighter)

NEW YORK—At the Hotel Pennsylvania where only a few weeks ago American Legion pranksters were tossing paper-water bags out of the windows, this week the American Chemical Society is in dignified session. For the first time, this society announces, lead, bismuth, thalium, platinum and tantalum atoms have been split, thus leading to a new phase of man's mastery of the atom. This will help heat our homes, run power machinery and fight disease. But it will not lessen the housewife's drudgery, says Glenn T. Seaborg, famed chemistry professor of the U. of California, where atom splitting was an early project. "It will be many years before the atom is harnessed in favor of the little woman in the kitchen," said the Professor in an interview.

00221

CHEMISTS GATHER FOR SESSIONS HERE

11,000 Will Attend Convention

Opening Tomorrow, Largest in Profession's History

9/14/47
The 11,000 chemists and chemical engineers who will attend the 112th national meeting of the American Chemical Society, which opens tomorrow and will continue for a week, began to gather here yesterday.

Eighteen professional divisions, meeting in six midtown hotels and the Engineering Societies Building, 29 West Thirty-ninth Street, will hear up to 1,000 technical papers in what was described as the largest assembly in the history of the profession.

The reports will cover recent research on rocket and jet fuels, progress in nuclear and radiation chemistry, advances in plastics, synthetic rubber and textiles, new synthetic sex hormones, improved methods of preserving food from spoilage, the manufacture of synthetic gasoline and oil from coal and natural gas, and many other subjects.

A highlight of the convention will come tomorrow night when the Priestley Medal, the highest award in American chemistry, is conferred upon Prof. Warren K. Lewis of the Massachusetts Institute of Technology for distinguished services to chemistry. Professor Lewis will speak on "The Kinetics of the Reactions of Steam and Carbon Dioxide with Carbon."

Award in Pure Chemistry

The \$1,000 American Chemical Society Award in pure chemistry, given by Alpha Chi Sigma, national chemical fraternity, will go to Prof. Glenn T. Seaborg of the University of California. Professor Seaborg, who was the co-discoverer of plutonium and who is a member of the general advisory committee of the United States Atomic Energy Committee, will speak on "Nuclear Transformations in the New High Energy Ranges."

Five other chemists will be hon-

ored. Prof. Mary Lura Sherrill, head of the department of chemistry at Mount Holyoke College, will receive the Francis P. Garvan Medal honoring women in chemistry; Prof. Van R. Potter of the McArdle Memorial Laboratory for Cancer Research at the University of Wisconsin Medical School, the Paul-Lewis Laboratories Award in enzyme chemistry.

Dr. George C. Supplee, head of the G. C. Supplee Research Corporation, Bainbridge, N. Y., will get the Borden Award in the chemistry of milk; Dr. Sidney P. Colowick of the Public Health Research Institute of the City of New York, the Eli Lilly & Co. Award in biological chemistry; and Dr. Louis Schmerling of the Universal Oil Products Company, Chicago, the new \$3,000 Ipatieff Prize for achievement in the field of catalysis.

Will Give Presidential Address

Prof. W. Albert Noyes Jr., president of the society and head of the department of chemistry in the University of Rochester, will preside. The presidential address will be on "The Mechanism of Photochemical Reactions."

Scientific conditions abroad will be surveyed in two addresses during the week. Dr. Roger Adams, chairman of the society's board of directors, will discuss "Science and Industry in Japan" on Tuesday, and on Wednesday Prof. George Scatchard of MIT will speak on "Some Aspects of the European Scientific Situation."

Many technical sessions will start at 9 A. M. tomorrow at the Hotel Pennsylvania, which is the general headquarters for the meeting. The paint, varnish and plastics division will meet at the Hotel New Yorker, the petroleum division in the Waldorf-Astoria, and the rubber division in the Hotel Commodore. Other meetings will be held in the McAlpin Hotel and the Roosevelt Hotel.

SEP 16 1947

Answer Nearing On What Holds Earth Together, Scientist Says

NEW YORK, Sept. 15.—(UP)—Prof. Glenn T. Seaborg, famed physicist of the University of California, said tonight science is entering the threshold of an era that may lead to solving the mystery of what holds the world together as one big atom.

Seaborg, codiscoverer of plutonium and a member of the general advisory committee of the United States atomic energy commission was one of those honored by the 112th national meeting of the American Chemical Society. He received the \$1,000 award in pure

chemistry, given by Alpha Chi Sigma, national chemical fraternity, for his achievements in nuclear science.

He said the "new phase" in nuclear science was "coming right on the heels of the amazing atomic energy development," and that "we may look forward to even more amazing developments."

Among these "amazing developments," he disclosed, may come the artificial production of mesotrons, known to be part of the mysterious cosmic rays that come from far out in space; the conversion of energy back into mass, or matter, and new light on the mystery of what holds the nucleus of the atom together.

Some scientists believe that the mesotrons coming with natural cosmic radiation may be the binding force in the nucleus of the atom, but this theory has been all but discarded.

Seaborg recalled the new accelerating machines that can "remodel" atoms by bombarding them with great electrical bullets, and said that even more powerful machines, capable of producing many millions, and possibly billions of electron volts, are now under construction or being planned.

He estimated that mesotrons should be produced in a machine accelerating more than 200,000,000 electron volts.

Atomic Report * * * * SEP 16 1947

* * * Five New Elements Split

May Soon Have Synthetic Gas and Oil

NEW YORK, Sept. 16 (INS) — The American Chemical Society, after hearing a startling report that the atoms of five more elements have been split, went ahead today to consider a cheap new process for making synthetic gasoline and oil.

Prof. Glenn T. Seaborg, famed University of California chemist, co-discoverer of plutonium, americium and curium, told the 112th national meeting of the society last night that the latest atoms to be split are lead, bismuth, thallium, platinum and tantalum.

He advised the 11,000 chemists gathered from all sections of the country that such common elements as lead and bismuth cannot at this time be used in the making of atomic bombs or as sources of atomic energy.

"The fission of these common elements opens no possibility for the production of self-sustaining chain reaction," he said. "One reason for this stems from the fact that any secondary emitted particles which might be eligible for chain reaction have much too small an energy to do so."

Soviet scientists, aided by Scandinavian physicists, recently were

reported seeking a cheap atomic source from lead.

Prof. Seaborg was given an award in pure chemistry for his achievements in nuclear science.

Process Is Described

The chemists were given a description of a new process which utilizes low-grade coal and lignite as raw materials for synthetic gasoline and oil.

According to a report by V. F. Parry, E. O. Wagner, A. W. Koth, and B. J. Goodman of the United States Bureau of Mines, Golden, Colorado, synthetic gas that can be converted directly into synthetic liquid fuels can now be generated

into continuous stream without the use of relatively expensive pure oxygen. The report continued:

"The new process has several applications through which a gas suitable for domestic purposes can be made efficiently in small plants by removing the carbon dioxide impurities."

Dr. Alfred Russell of the United States Department of Agriculture, Peoria, Ill., announced that annual waste of millions of tons of lignin, a major constituent of wood, may be halted through synthesis of this raw material.

Material Is Wasted

He explained that the 38 million tons of lignin, which are obtained each year as a by-product, are for the most part discarded as waste. Dr. Russell disclosed:

"Exploitation of lignin as a raw material could not only conserve other, scarcer natural resources, but also lower the prices of lumber, paper, and other wood products."

In another report, W. V. Cruess and John H. Kilbuck of the University of California, revealed that mellow, fruitier and clearer wines are obtained by enriching grapes with additional enzymes.

The report said that wine, which has had pectinol, a commercial enzyme, added to it to accelerate its clearing, unexpectedly developed a fruitier flavor and materially hastened the disappearance of the green flavor of new wines.

This Clipping From
NYACK, N. Y.
JOURNAL-NEWS

This Clipping From
CLINTON, MASS.
SEP 16 1947

SYNTHETIC GASOLINE-OIL

May Now Be Pro- duced By New Pro- cess, Says Chemist

By JAMES WALSH

International News Service Staff
Correspondent

New York, Sept. 16—The American Chemical Society, after receiving a startling report that the atoms of five more elements have been split, went ahead today to consider a cheap new process for making synthetic gasoline and oil. Prof. Glenn T. Seaborg, famed University of California chemist, co-discoverer of plutonium, Americium and curium, told the 112th national meeting of the Society, last night, that the latest atoms to be split are lead, bismuth, thallium, platinum and tantalum.

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Col., synthetic gas that can be converted directly into synthetic liquid fuels can now be generated into a continuous stream without the use of relatively expensive pure oxygen.

The report continued:

"The new process has several applications through which a gas suitable for domestic purposes can be made efficiently in small plants by removing the carbon dioxide impurities."

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Dr. Russell disclosed: "Exploitation of lignin as a raw material could not only conserve other, scarcer natural resources, but also lower the prices of lumber, paper, and other wood products."

In another report, W. V. Cruess and John H. Kilbuck, of the University of California, revealed that mellow, fruitier and clearer wines are obtained by enriching grapes with additional fruit enzymes.

The report said that wine, which has had pectinol, a commercial enzyme, added to it to accelerate its clearing, unexpectedly developed a fruitier flavor and materially hastened the disappearance of the green flavor of new wines.

Atom Power Reverse Seen

Energy May Be Used to Create Matter

North American Newspaper Alliance

New York—Billion-volt atom smashers with five times the "punch" of an exploding uranium atom are being designed.

They may enable man to create matter out of energy, just as matter is converted into energy in the atomic bomb explosion.

Science then will be able to duplicate on a small scale the processes by which the basic particles of matter—protons, electrons and neutrons—are created.

This startling development of the future was predicted before the American Chemical Society here Monday night by Dr. Glenn T. Seaborg of the University of California. He is credited with the first production of plutonium five years ago.

All this will mean, Dr. Seaborg pointed out, that man will enter a new area of energy beyond that of atomic fission, which stops at about 200 million electron volts. At that stage, only the disintegration of matter on a limited scale is possible.

Dr. Seaborg sees no immediate practical value in the forthcoming probable creation of matter, other than a better understanding of atomic structures. But the very fact that it could be accomplished would mean that man has a power which has not been known previously on Earth.

This Clipping From
NEW YORK, N. Y.
HERALD TRIBUNE

SEP 16 1947

Atomic Science Nears Clew to Creating Matter

Dr. Seaborg Tells Chemists of Ultra-High Energies That Go Beyond Fission

Nuclear science is on the threshold of "an important new phase of development" which is expected to crumble the nucleus of the atom and may bare its secrets to the scientist, it was reported here yesterday to the American Chemical Society by Professor Glenn T. Seaborg, of the University of California.

Dr. Seaborg, who spoke at Manhattan Center at a general session of the society's 112th national meeting being held here this week, was a co-discoverer of plutonium and is a member of the advisory committee to the United States Atomic Energy Commission. He presented a review of recent developments in nuclear science, particularly at his university at Berkeley, in which he said a beginning has been made in exploring the "ultra-high energy" ranges.

At Berkeley, he explained, matter has been bombarded with particles with energies of up to 400,000,000 volts. This, however, is only the lower fringe of the ultra-high energies, which extend into the billions of volts. Plans are now being completed, he said, for "the construction in the rather immediate future" of a number of machines capable of accelerating electrons and light positive ions to an energy of a billion volts.

Beyond Atomic Piles

"It is quite probable that the coming step into the very high energy region," he said, "will go beyond the rearrangement of nuclear particles and enter the area of important insight into interactions and internal transformations of the fundamental nuclear particles themselves."

The Berkeley synchro-cyclotron has already blasted atoms to an extent that dwarfs the disruption caused by fission in atomic piles, he explained. While only two or

three particles are freed in fission, he said, the new energies have knocked off as many as thirty or forty particles from the nucleus. To distinguish this reaction from the earlier one, he coined the word "spallation"—from the verb spall, meaning "to fall to pieces by chipping."

The increased spallation that will be possible with higher energies may make it possible to create mesatrons by artificial means, he continued. Since mesatrons are believed to be intimately involved in the interaction of neutrons and protons through which they are held together to form a nucleus, he said, their study "might just give the key which is needed to the fundamental understanding of the nucleus of the atom."

As a further possibility, he said, it might then become possible synthetically to create neutrons and protons. This would be creating matter from energy—the opposite of atomic fission.

New Machine for Brookhaven

Dr. Seaborg said that among the ultra-high energy machines now being planned is one conceived by W. M. Brobeck of the University of California, and another that is being developed for inclusion among the group being built by the Brookhaven (L. I.) National Laboratory.

The new machines do not require higher primary voltages, he said, as they use "resonance acceleration," in which both the frequency of application of the accelerating voltage and the strength of the magnetic field are varied as the particle gains successive increments of energy as it rotates about a fixed orbit.

At another meeting yesterday a method of making fertilizer from lignin—a waste product left when paper is made from wood pulp—was described by Dr. Robert S. Arles, of the Polytechnic Institute of Brooklyn. He spoke to the society's division of industrial and engineering chemistry, at the Hotel Commodore.

In three years of tests, he said, farmers who used lignin as a fertilizer ingredient reported lower production costs and increased yields of 40 to 60 per cent. The fertilizer could become an "immediate factor in lowering the nation's food prices" through these lowered costs and increased yields, he said.

This Clipping From
STOCKTON, CAL.
RECORD

SEP 16 1947

Synthetic Gas, Oil Plans Are Studied

NEW YORK, Sept. 16 (INS)—The American Chemical Society, after hearing a startling report that the atoms of five more elements have been split, went ahead today to consider a cheap new process for making synthetic gasoline and oil.

Prof. Glenn T. Seaborg, famed University of California chemist, co-discoverer of plutonium, americium and curium, told the 112th national meeting of the society last night that the latest atoms to be split are lead, bismuth, thallium, platinum and tantalum.

TALKS TO 11,000

He advised the 11,000 chemists gathered from all sections of the country that such common elements as lead and bismuth cannot at this time be used in the making of atomic bombs or as sources of atomic energy. He said:

"The fission of these common elements opens no possibility for the production of self-sustaining chain reaction. One reason for this stems from the fact that any secondary emitted particles which might be eligible for chain reaction have much too small an energy to do so."

SEEK CHEAP SOURCE

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Prof. Seaborg was given an award in pure chemistry for his achievements in nuclear science.

The chemists were given a description of a new process which utilizes low-grad coal and lignite as raw materials for synthetic gasoline and oil.

SYNTHETIC GAS

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The report continued:

"The new process has several applications through which a gas suitable for domestic purposes can be more efficiently produced in small plants by removing the carbon dioxide impurities."

Atoms of 5 More Elements Split; New Synthetics Seen

Science Goes Ahead in Plan for Cheap New Process for Making Gasoline and Oil.
11,000 Chemists Meet.

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This Clipping From
WEST WARWICK, R. I.
PAWTUCKET VALLEY TIMES

SEP 16 1947

This Clipping From
PHILADELPHIA, PA.
EVENING BULLETIN

This Clipping From
ROCHESTER, N. Y.
TIMES UNION

SEP 16 1947

5 More Atoms Said Split

NEW YORK—(INS)—The American Chemical Society today pondered a startling report that the atoms of five more elements have been split.

Prof. Glenn T. Seaborg University of California chemist and co-discoverer of plutonium, Americium and curium, told the 112th national meeting of the society last night that the latest atoms to be split are lead, bismuth, thallium, platinum and tantalum.

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5 New Atoms Split; None Has Chain Reaction

Bulletin-N. Y. Times Service
New York, Sept. 16.—The splitting for the first time of atoms of lead, bismuth, thallium, platinum and tantalum, thus opening up a new phase in man's mastery of the atom, was announced last night before the annual meeting of the American Chemical Society.

Eleven thousand chemists from all parts of the country are attending the sessions.

The announcement was made by Prof. Glenn T. Seaborg, famed University of California chemist, co-discoverer of plutonium, americium and curium, who also played a major role in devising the method for the chemical purification of plutonium. Before he spoke, Prof. Seaborg received the \$1,000 ACS award in pure chemistry, given by Alpha Chi Sigma, national chemical fraternity, for his achievements in nuclear science.

Only Three Split Earlier

Until now only two natural elements, uranium and thorium, and one man-made element, plutonium, had been subjected to the process of fission, one of the two fundamental processes that make possible the atomic bomb as well as the harnessing of atomic energy for power. The other process involved the liberation of neutrons in sufficient number to maintain a chain reaction.

tribution characterized by a much shallower dip between the maxima than occurs with slow-neutron fission, and the yields of the lightest among the observed fission products are much higher.

Other members of the research team which did this work were B. B. Cunningham, H. H. Hopkins, Manfred Lindner, D. R. Miller, P. R. O'Conner, and R. C. Thompson.

Photographs of three- to five-particle disintegrations of light elements, the most complete yet recorded, were shown at the same meeting by Robert Thornton who reported cloud chamber studies in the giant cyclotron by Wilson Powell. Photographs were made of recoil protons and disintegrating atoms resulting from the passage of neutron beams from 200-mev. deuterons through oxygen, nitrogen, carbon, and helium. Oxygen was shown frequently to split up into four doubly charged particles which may be alpha particles. Photographs also show three- and five-pronged "stars" similar to those found in low energy cosmic radiation; they are the first produced by cyclotron bombardment. The 100-mev. neutrons are, in effect, low energy cosmic rays.

All of the work reported in these papers was performed in the course of a pure research program sponsored by the Atomic Energy Commission in collaboration with the University of California's Radiation Laboratory and College of Chemistry.

This Clipping From
ATLANTA, GA.
JOURNAL

SEP 16 1947

California Scientists Split Five More Atoms

NEW YORK, Sept. 16.—(U.P.)—University of California scientists, using new and more powerful accelerating machines, have split five more atoms, opening up new approaches to further studies into nuclear science, it was disclosed Tuesday.

The atoms split were bismuth, lead, thallium, platinum and tantalum.

A review of the work at California was given by Prof. Glenn T. Seaborg of California at the 112th national meeting of the American Chemical Society. He emphasized that as a result of the fission of the five new atoms there could be no possibility of their being used for atomic energy.

Atomic Science Nears Clew to Creating Matter

Dr. Seaborg Tells Chemists of Ultra-High Energies That Go Beyond Fission

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SEP 16 1947



DR. GLENN T. SEABORG, of the University of California, received the \$1,000 American Chemical Society award in pure chemistry last night for his achievements in nuclear science. Dr. Seaborg, co-discoverer of plutonium, and a member of the general advisory committee of the United States Atomic Energy Commission, delivered an address on "Nuclear Transformations in the New High Energy Ranges."

WACO, TEXAS
TIMES HERALD

SEP 16 1947

PHYSICIST SAYS ERA MAY FIND WHAT HOLDS THE WORLD TOGETHER

NEW YORK, Sept. 16.—UP—Prof. Glenn T. Seaborg, famed physicist of the University of California, said last night that science is entering the threshold of an era that may lead to solving the mystery of what holds the world together as one big atom.

Seaborg, co-discoverer of plutonium and a member of the General Advisory committee of the United States Atomic Energy Commission, was one of those honored by the 112th national meeting of the American Chemical Society. He received the \$1,000 award in pure chemistry, given by Alpha Chi Sigma, national chemical fraternity, for his achievements in nuclear science.

BERKELEY GAZETTE 9/16/47

Element Discovered at U. C. Is Isolated for First Time

The heaviest substance known to man, the synthetic element 96, called curium, has been isolated for the first time in pure form in sufficient quantity to be visible to the naked eye.

This was reported today by Dr. Isadore Perlman, noted nuclear chemist in the University of California Radiation Laboratory, to the meeting of the American Chemical Society in New York.

The extremely radioactive, tiny quantity of the heaviest of all elements is so radioactive that it gives off a soft glow.

The world's only supply of the element, which is so small it would be lost in a thimble, was produced by the Atomic Energy Commission in the atomic pile, and isolated by L. B. Werner, working with Dr. Perlman here in Berkeley. It was made by the long term bombardment of a tiny quantity of americium, element 95, with neutrons in the pile.

DISCOVERED AT U. C.

Describing for the first time some of the characteristics of curium, which was discovered two years ago by bombardments in the University of California 225-ton cyclotron, Dr. Perlman said it had a half-life of five months. It is so radioactive that each millionth of a gram emits 70 billion alpha particles per minute. One half of one per cent of any given quantity "dies" each day, disintegrating into plutonium, of isotopic number 238. It is one of the most radioactive substances ever isolated in pure form.

Studying curium by special microchemical methods based on techniques developed in plutonium research. Dr. Perlman and Werner

determined the absorption spectrum of the element. They found that the electronic structure of the atom is very stable, and that visible light does not displace the electrons. They found evidence for a very stable electron structure in the curium does not absorb visible light, confirming a prediction of Dr. G. T. Seaborg, discoverer of the element.

With Dr. Perlman's announcement, all four of the synthetic trans-uranic elements, neptunium, plutonium, americium, and curium, have been isolated and studied in the laboratory.

The isolation of curium was a more difficult feat than any of the other three, because of its extreme radioactivity and the smaller amounts in which it could be produced, Dr. Perlman said.

EVANSVILLE, IND.
PRESS

SEP 16 1947

Announce Splitting Of Five More Atoms

NEW YORK, Sept. 16.—(UP)—University of California scientists, using new and more powerful machines, have split five more atoms it was disclosed today.

The atoms split were bismuth, lead, thallium, platinum and tantalum.

A review of the work at California was given by Prof. Glenn T. Seaborg of California at the 112th national meeting of the American Chemical Society. He emphasized that as a result of the fission of the five new atoms there could be no possibility of their being used for atomic energy.

SEP 16 1947

SCIENTIST TELLS OF USELESS TYPE OF ATOM SPLITTING

NEW YORK, Sept. 16 (AP)—Dr. Glenn T. Seaborg of the University of California last night described the splitting of atoms of lead, bismuth, thallium, platinum and tantalum.

In an address to the American Chemical Society he explained that this splitting, although it resembles the splitting of uranium and plutonium in atom bombs, is of no practical use for bombs or otherwise.

The energy released by splitting lead, and the other atoms, is tremendous, but the energy that is emitted is not enough to split another nearby atom. In the bomb metals a single atom splitting causes others nearby to break in two and so inaugurates a chain reaction which makes an explosion or gives heat.

The new splits were made in the University of California cyclotron, which drives atomic particles (fractions of atoms) at speeds of thousands of miles a second. These particles act like projectiles to split other atoms that they hit. The energies of the particles shot by the California machine ranged from 200,000,000 electron-volts to 400,000,000. All the "bullet" particles were much heavier than the particles that cause the bomb metals to split.

BOSTON, MASS.
HERALD

SEP 16 1947

Seaborg Sees Creation Of Matter from Energy

NEW YORK, Sept. 15 (AP)—Scientists in the not too far distant future may succeed in creating matter out of energy, Prof. Glenn T. Seaborg of the University of California, a co-discoverer of plutonium, predicted tonight.

Dr. Seaborg addressed a dinner meeting of the American Chemical Society after receiving the society's \$1000 award in pure chemistry, given by the national chemical fraternity Alpha Chi Sigma for his achievements in nuclear science.

Chemists Conclave Hears More Atoms Split, Considers Cheap Method for Synthetic Gas

NEW YORK, Sept. 16 (INS)—The American Chemical Society, after hearing a startling report that the atoms of five more elements have been split, went ahead today to consider a cheap new process for making synthetic gasoline and oil.

Prof. Glenn T. Seaborg, famed University of California chemist, co-discoverer of plutonium, americium and curium, told the 112th national meeting of the society last night that the latest atoms to be split are lead, bismuth, thallium, pratinum and tantalum.

He advised the 11,000 chemists gathered from all sections of the country that such common elements as lead and bismuth cannot at this time be used in the making of atomic bombs or as sources of atomic energy. He said:

"The fission of these common elements opens no possibility for the production of self-sustaining chain reaction. One reason for this stems from the fact that any secondary - emitted particles which might be eligible for chain reaction have much too small an energy to do so."

Soviet scientists, aided by Scandinavian physicists, recently were reported seeking a cheap atomic source from lead.

Prof. Seaborg was given an award in pure chemistry for his achievements in nuclear science.

The chemists were given a description of a new process which utilizes low-grade coal and

lignite as raw materials for synthetic gasoline and oil.

According to a report by V. F. Parry, E. O. Wagner, A. W. Koth and B. J. Goodman of the United States Bureau of Mines, Golden, Colo., synthetic gas that can be converted directly into synthetic liquid fuels can now be generated into a continuous stream without the use of relatively expensive pure oxygen.

The report continued:

The new process has several applications through which a gas suitable for domestic purposes can be more efficiently in small plants by removing the carbon dioxide impurities."

NEW RADIOACTIVE SOLID PREPARED

NEW YORK, Sept. 16 (U.P.)—A pencil-point sized bit of the world's most violently radioactive solid has been prepared in pure form and can be seen with the naked eye, a California scientist reported today.

This element, known as curium, is mad-made and outranks uranium in weight. It also is heavier than neptunium, plutonium and americium, three other artificially made solids.

The report that curium has been prepared in pure form was made by Prof. Isadore Perlman of the University of California at the meeting of the American Chemical Society.

Perlman said that the amount of curium produced is smaller than a grain of sand. It is so radioactive, however, that it seethes and bubbles and emits a soft glow. This tiny amount of curium, he reported, emits alpha particles at a rate of 70,000,000,000 a minute for each one millionth of a gram in the element. Alpha particles are electrically charged helium atoms.

Winners of six other awards presented at the same time included:

Prof. Warren K. Lewis of Massachusetts Institute of Technology, the Priestley Medal for distinguished services to chemistry;

Prof. Mary Lura Sherrill, Mount Holyoke College, the Francis P. Garvan Medal, honoring women in chemistry.

Famed Physicist Predicts Science Entering New Era of Discoveries

NEW YORK, Sept. 15.—(UP)—Prof. Glenn T. Seaborg, famed physicist of the University of California, said tonight that science is entering the threshold of an era that may lead to solving the mystery of what holds the world together as one big atom.

Seaborg, co-discoverer of plutonium and a member of

the general advisory committee of the United States atomic energy commission, was one of those honored by the 112th national meeting of the American Chemical Society. He received the \$1,000 award in pure chemistry, given by Alpha Chi Sigma, national chemical fraternity, for his achievements in nuclear science.

He said the "new phase" in nuclear science was "coming right on the heels of the amazing atomic energy development," and that "we may look forward to even more amazing developments."

Among these "amazing developments," he disclosed, may come the artificial production of mesotrons, known to be part of the mysterious cosmic rays that come from far out in space; the conversion of energy back into mass, or matter, and new light on the mystery of what holds the nucleus of the atom together.

The atom is composed of protons, neutrons and electrons, with protons and neutrons forming the nucleus. Electrons, with a negative charge, are the "cover" of the nucleus. They are held in place because of the positively charged protons. Opposite charges attract each other. The mystery is what holds the protons and the neutrons together in the nucleus as there is no apparent attraction there.

Some scientists believe that the mesotrons coming with natural cosmic radiation may be the binding force in the nucleus of the atom, but this theory has been all but discarded.

Seaborg recalled the new accelerating machines that can "re-model" atoms by bombarding them with great electrical bullets, and said that even more powerful machines, capable of producing many millions, and possibly billions of electron volts, are now under construction or being planned.

"It may be possible," he said, "with such energies, to create mesotrons by artificial means for the first time."

He estimated that mesotrons should be produced in a machine accelerating more than 200 million electron volts.

Science Nears Threshold Of Many Atom Mysteries

New York, Sept. 15.—(UP)—Prof. Glenn T. Seaborg, famed physicist of the University of California, said tonight that science is entering the threshold of an era that may lead to solving the mystery of what holds the world together as one big atom.

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ST. PAUL, MINN.
DISPATCH
SEP 16 1947

U. S. Chemists Seek Cheap Synthetic Gas, Oil Key

NEW YORK — (INS) — The American Chemical society, after hearing a startling report that the atoms of five more elements have been split, went ahead today to consider a cheap new process for making synthetic gasoline and oil.

Prof. Glenn T. Seaborg, famed University of California chemist, co-discoverer of plutonium, americium and curium, told the 112th national meeting of the society Monday night that the latest atoms to be split are lead, bismuth, thallium, platinum and tantalum.

He advised the 11,000 chemists gathered from all sections of the country that such common elements as lead and bismuth cannot this time be used in the making of atomic bombs or as sources of atomic energy, he said:

"The fission of these common elements opens no possibility for the production of self-sustaining chain reaction. One reason for this stems from the fact that any secondary emitted particles which might be eligible for chain reaction have much too small an energy to do so."

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The report continued: "The new process has several applications through which a gas suitable for domestic purposes can be made efficiently in small plants by removing the carbon dioxide impurities."

BOSTON, MASS.
MORNING GLOBE

SEP 16 1947

M. I. T., Mt. Holyoke Scientists Honored

NEW YORK, Sept. 15 (AP)— Scientists in the not too far distant future may succeed in creating matter out of energy, Prof. Glenn T. Seaborg of the University of California, a co-discoverer of plutonium, predicted tonight.

Dr. Seaborg based his prediction while describing experiments before the American Chemical Society after receiving the society's \$1,000 award in pure chemistry, given by the national chemical fraternity Alpha Chi Sigma for his achievements in nuclear science.

Winners of six other awards presented at the same time included:

Prof. Warren K. Lewis, Massachusetts Institute of Technology, Priestley medal for distinguished services to chemistry, and Prof. Mary Lura Sherrill, Mount Holyoke College, Francis P. Garvan medal honoring women in chemistry.

LOS ANGELES, CALIF.
EXAMINER

SEP 16 1947

U. C. MAPS BIG ATOM SMASHER

NEW YORK, Sept. 15.— (NANA) — Billion-volt atom smashers with five times the "punch" of an exploding uranium atom, already are in the design stage.

They may enable man to create matter out of energy, just as matter is converted into energy in the atomic bomb explosion.

Science then will be able to duplicate on a small scale the processes by which the basic particles of matter—protons, electrons and neutrons—are created in the cosmos.

This startling development of the not-too-distant future was predicted before the American Chemical Society here tonight by Dr. Glenn T. Seaborg of the University of California, who is credited with the first production of plutonium five years ago.

ONE AT UC—

One machine calculated to accelerate primary particles such as neutrons with forces exceeding a billion electron volts is planned for the Brookhaven Laboratory of the Atomic Energy Commission located at the former site of Camp Upton, L. I.

Another has entered the stage of preliminary design at the University of California. Both are on the basic cyclotron pattern but with far greater potentialities than anything now in existence.

All this will mean, Dr. Seaborg pointed out, that man will enter a new era of energy beyond that of atomic fission which stops at about 200,000,000 electron volts—a stage at which only the disintegration of matter on a limited scale is possible.

SEP 16 1947

AMAZING DEVELOPMENTS

Science Expects Key Soon To Creation of Matter

NEW YORK, Sept. 15 (UP) — Prof. Glenn T. Seaborg, famed physicist of the University of California, said Monday night that science is entering the threshold of an era that may lead to solving the mystery of what holds the world together as one big atom.

Seaborg, codiscoverer of plutonium and a member of the general advisory committee of the United States Atomic Energy commission, was one of those honored by the 112th national meeting of the American Chemical society. He received the \$1000 award in pure chemistry, given by Alpha Chi Sigma, national chemical fraternity, for his achievements in nuclear science.

He said the "new phase" in nuclear science was "coming right on the heels of the amazing atomic energy development," and that "we may look forward to even more amazing developments."

Among these "amazing developments," he disclosed, may come the artificial production of mesotrons, known to be part of the mysterious cosmic rays that come from far out in space; the conversion of energy back into mass, or matter, and new light on the mystery of what holds the nucleus of the atom together.

The atom is composed of protons, neutrons and electrons, with protons and neutrons forming the nucleus. Electrons, with a negative charge, are the "cover" of the nucleus. They are held in place because of the positively charged protons. Opposite charges attract each other. The mystery is what holds the protons and the neutrons together in the nucleus as there is no apparent attraction there.

Some scientists believe that the mesotrons coming with natural cosmic radiation may be the binding force in the nucleus of the atom, but this theory has been all but discarded.

Seaborg recalled the new accelerating machines that can "re-model" atoms by bombarding them with great electrical bullets, and said that even more powerful machines, capable of producing many millions, and possibly billions of electron volts, are now under construction or being planned.

NEW YORK, N. Y.
POST

SEP 16 1947

Chemists Hear of Progress Splitting of 5 New Atoms Reported

A new metal that seethes, bubbles, emits a soft glow and disappears was described today to the meeting of the American Chemical Society at Manhattan Center.

Dr. Isadore Perlman, of the University of California, described curium, one of four man-made metals which are non-existent in nature. He said barely enough to see with the naked eye has been produced and that half of what exists disappears by virtue of extreme radioactivity every 57 days.

The society heard last night of the splitting of five new atoms—those of lead, bismuth, thallium, platinum and tantalum—but was assured that none was capable of a chain reaction and hence that all were useless for the production of energy or atomic bombs.

The speaker was Dr. Glenn T. Seaborg, also of the University of California, who received the society's \$1,000 award in pure

chemistry for his achievements in nuclear science, which include co-discovery of the manmade elements.

Dr. Seaborg said a beginning has been made in the exploration of "ultra-high energies," which may lead eventually to the creation of matter from energy, a process which is the reverse of atomic fission.

MARYSVILLE, O.
TRIBUNE

SEP 16 1947

REPORT MORE ATOMS SPLIT

NEW YORK, Sept. 16—The American Chemical Society, after hearing a startling report that the atoms of five more elements have been split, went ahead today to consider a cheap new process for making synthetic gasoline and oil.

Prof. Glenn T. Seaborg, famed University of California chemist, co-discoverer of plutonium, americium and curium, told the 112th national meeting of the society last night that the latest atoms to be split are lead, bismuth, thallium, platinum and tantalum.

"It may be possible," he said, "with such energies to create mesotrons by artificial means for the first time."

He estimated that mesotrons should be produced in a machine accelerating more than 200,000,000 electron volts.

"The mesotron plays an important role in the current theories of nuclear structure in that it is supposed to be intimately involved in the very fundamental interaction between neutrons and protons through which they are held together to create a nucleus," he said.

"It is, therefore, hoped that their study as a result of their production in quantity by artificial means might give just the key which is needed to the fundamental understanding of the nucleus of the atom."

SEP 16 1947

Creation of Matter From Energy Predicted by Atomic Scientist

By Thomas R. Henry

Star Staff Correspondent

NEW YORK, Sept. 16.—Billion-volt atom smashers, with five times the punch of an exploding uranium atom, already are in the design stage, the convention of the American Chemical Society was told last night.

They may enable man to create matter out of energy, just as matter is converted into energy in the atomic bomb explosion.

Science then will be able to duplicate on a small scale the processes by which the primeval particles of matter—protons, electrons and neutrons—are created in the cosmos.

This startling development of the not too distant future, which will mean entrance into an energy realm about as far above that of plutonium explosion as this was above any form of energy known in the past, was forecast by Dr. Glenn T. Seaborg of the University of California, who is credited with the first production of plutonium five years ago.

Two Already Planned.

One machine calculated to accelerate primary particles such as neutrons with forces exceeding a billion electron volts is planned for the Brookhaven Laboratory of the Atomic Energy Commission on the old site of Camp Upton, L. I. Another has entered the stage of preliminary design at the University of California. Both are on the basic cyclotron pattern, but with vastly greater potentialities than anything now in existence.

All this will mean, Dr. Seaborg pointed out, that men will have entered a new area of energy beyond that of atomic fission which stops at about 200,000,000 electron volts—a stage at which only the disintegration of matter on a limited scale is possible.

Under the law of mass-energy equivalence first proposed by Prof. Albert Einstein and applied in the atomic bomb, matter is energy at rest in the form of nuclear particles. A very minute amount of this matter becomes energy again in the nuclear explosion of the atomic bomb.

Enormous Amounts of Energy.

The apparent great difficulty of reversing the process comes from the enormous amounts of energy required. Thus, Dr. Seaborg pointed out, a single neutron or proton, the particles making up the atomic nucleus, is the mass equivalent to

about a billion volts. In nature they apparently are produced only in pairs—so at least 2,000,000,000 volts would be required. It might be necessary to accelerate particles with a force of close to 3,000,000,000 volts before any actual conversion of energy to mass could be expected, he believes.

One conversion of this kind, however, may be close at hand. Cosmic rays, entering the earth's outer atmosphere with energies hitherto unduplicable on earth, produce mysterious material particles known as mesotrons. They are about 200 times the mass of electrons and, after they are created, persist as matter for only about a billionth of a second. They presumably are the most unstable of all forms of matter.

The cosmic rays which produce these, Dr. Seaborg said, fall in an energy range of only a few hundred million electron volts, and changes now are planned in the 184-inch cyclotron at the University of California so that it will accelerate neutrons which such forces. They are about twice those realized in the splitting of an atom of uranium or plutonium.

Dr. Seaborg saw no immediate practical value in the forthcoming probable creation of matter, other than a better understanding of atomic structures. But the very fact that it could be accomplished would mean that man had in his hands a power which has not existed on earth and is known only from the emanations of the Milky Way impinging on the planet's outer atmosphere.

Brought Astounding Results.

The progress toward more powerful atom smashers, he pointed out, already has brought astounding results. Within the past few months it has made possible the production of about 100 new isotopes, hitherto nonexistent forms of the familiar elements, uses for which are as yet entirely unexplored. From the Government's great atomic ovens about 500 such isotopes have been produced. The new ones require greater energies than are possessed by the "piles."

The society's highest award, the Priestly Medal, was presented last night to Dr. Warren K. Lewis, of the Massachusetts Institute of Technology for a new technique of changing coal into fuel gas which may have far-reaching implications

for the future of the industry. Because of this technique, it is likely, very little coal will be burned as coal, a wasteful process, in the next few years.

With the Lewis process the coal is reduced to a fine powder and suspended like a cloud in a stream of hot air and steam. From this is produced a mixture of carbon dioxide and hydrogen. It will make possible, Dr. Lewis explained, use of the cheaper grades of coal, such as the great lignite beds of the West, for all sorts of power production.

The gas also will serve as the oil and gasoline. The technique was hailed as the culmination of more than 75 years of research in the United States.

Already, it was revealed in a paper presented by P. W. Edeburn, L. D. Schmidt and J. P. McGee of the Bureau of Mines, this process has made possible a great reduction in the cost of synthetic gasoline. In the past one of the necessary steps has been the production of coke. Changing the coal directly into gas makes it possible completely to sidestep this.

This Clipping From

Providence R.I.
Journal

SEP 16 1947

BIG ATOM BREAKER IN DESIGN STAGE

Matter May Be Created from
Energy in Billion - Volt
Smasher, Expert Hopes

BY THOMAS R. HENRY

New York, Sept. 15.—(NANA)—Billion-volt atom smashers with five times the "punch" of an exploding uranium atom, already are in the design stage.

They may enable man to create matter out of energy, just as matter is converted into energy in the atomic bomb explosion.

Science then will be able to duplicate on a small scale the processes by which the basic particles of matter—protons, electrons and neutrons—are created in the cosmos.

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2 Machines Planned

One machine calculated to accelerate primary particles such as neutrons with forces exceeding a billion electron volts is planned for the Brookhaven Laboratory of the Atomic Energy Commission located at the former site of Camp Upton, L. I. Another has entered the stage of preliminary design at the University of California. Both are on the basic cyclotron pattern, but with far greater potentialities than anything now in existence.

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Difficulty in Reversing Process

The great difficulty in reversing the process comes from the enormous amount of energy required. Thus, Dr. Seaborg declared, a single neutron or proton, the particles making up the atomic nucleus, is the mass equivalent to about a billion volts. In nature they apparently are produced only in pairs—so at least 2,000,000,000 volts would be required. It might be necessary to accelerate particles with a force of close to 3,000,000,000 volts before any actual conversion of energy to mass could be expected, he believes.

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No Practical Value Now

Dr. Seaborg saw no immediate practical value in the forthcoming probable creation of matter, other than a better understanding of atomic structures. But the very fact that it could be accomplished would mean that man had a power which has not existed on earth and is known only from the emanations of the milky way impinging on the planet's outer atmosphere.

The progress toward more powerful atom smashers, he pointed out, already has brought astounding results. Within the past few months it has made possible the production of about 100 new isotopes, hitherto non-existent forms of familiar elements, whose uses are not yet explored. With a 400,000,000 electron volt bombardment at the University of California, Dr. Seaborg continued, it has been possible to change arsenic into chlorine. With a billion-volt atom smasher, it will be just as simple to convert mercury into gold, or vice versa.

Until very recently the actual splitting of atoms has been confined to the radioactive elements—uranium, thorium and actinium—

and the artificially produced plutonium. The new atom smashers, however, have caused fission of bismuth, lead, thallium, platinum and tantalum. This does not mean, Dr. Seaborg warned, a new source of atomic power because each atom must be split separately. No chain reaction is set up, as in the case of plutonium. The new machines also, he explained, have made possible the multiple splitting of the radioactive elements. In the uranium fission reaction of the atomic bomb, the atom is split only into two pieces of about equal size—usually constituting the element barium and something quite close to it in the atomic table. Now a single uranium atom can be split into 15 or 20 fragments. Here again no means is known of continuing this as a chain reaction,

Science Seen On Threshold Of New Era

What Holds World Together As Atom May Be Unfolded Is Claim

New York, Sept. 15.—(UP.)—Professor Glenn T. Seaborg, famed physicist of the University of California, said tonight that science is entering the threshold of an era that may lead to solving the mystery of what holds the world together as one big atom.

Seaborg, codiscoverer of plutonium and a member of the general advisory committee of the United States Atomic Energy Commission, was one of those honored by the one hundred and twelfth national meeting of the American Chemical Society. He received the \$1000 award in pure chemistry, given by Alpha Chi Sigma, national chemical fraternity, for his achievements in nuclear science.

He said the "new phase" in nuclear science was "coming right on the heels of the amazing atomic energy development," and that "we may look forward to even more amazing developments."

Developments In Prospect.

Among these "amazing developments," he disclosed, may come the artificial production of mesotrons, known to be part of the mysterious cosmic rays that come from far out in space; The conversion of energy back into mass, or matter, and new light on the mystery of what holds the nucleus of the atom together.

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"It may be possible," he said, "with such energies to create mesotrons by artificial means for the first time."

This Clipping From
HARTFORD, CONN.
COURANT

SEP 16 1947

This Clipping From
TACOMA, WASH.
NEWS-TRIBUNE

Matter From Energy Next Step of Science

By THOMAS R. HENRY
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The great difficulty in reversing the process comes from the enormous amount of energy required. Thus, Dr. Seaborg declared, a single neutron or proton, the particles making up the atomic nucleus, is the mass equivalent to about a billion volts. In nature they apparently are produced only in pairs—so at least 2,000,000,000 volts would be required. It might be necessary to accelerate particles with a force of close to 3,000,000,000 volts before any actual conversion of energy to mass could be expected, he believes.

Scientists Hope To Create Matter Out of Energy

NEW YORK, Sept. 15. (AP) — Scientists in the not too far distant future may succeed in creating matter out of energy, Prof. Glenn T. Seaborg of the University of California, a codiscoverer of plutonium, predicted tonight.

This may come, he said, through more powerful machines for bombarding atoms, machines that would be giant successors to present cyclotrons. Some of these new machines now are in the preliminary design stage.

Dr. Seaborg based his prediction on progress made in smashing atoms at the University of California, describing experiment there in which 20 to 30 to 40 particles have been knocked off atoms of target materials. The bombardments changed the target elements into other elements, and also produced many radioactive substances.

Dr. Seaborg addressed a dinner meeting of the American Chemical Society after receiving the society's \$1000 award in pure chemistry, given by the national chemical fraternity Alpha Chi Sigma for his achievement.

This Clipping From
GALVESTON, TEXAS
NEWS

SEP 16 1947

N. Y. TIMES 7/16/47
**5 NEW ATOMS SPLIT;
USELESS FOR BOMBS**

**Lead, Bismuth Among Them,
but World Is Assured None
Can Give Chain Reaction**

By **WILLIAM L. LAUBENCE**

The splitting for the first time of atoms of lead, bismuth, thallium, platinum and tantalum, thus opening up a new phase in man's mastery of the atom, was announced last night before the annual meeting of the American Chemical Society. Eleven thousand chemists from all parts of the country are attending the sessions.

The announcement was made at the general meeting of the society at Manhattan Center by Prof. Glenn T. Seaborg, famed University of California chemist, co-discoverer of plutonium, americium and curium, who also played a major role in devising the method for the chemical purification of plutonium. Before he spoke, Professor Seaborg received the \$1,000 ACS Award in pure chemistry, given by Alpha Chi Sigma, national chemical fraternity, for his achievements in nuclear science.

Until now only two natural elements, uranium and thorium, and one man-made element, plutonium, had been subjected to the process of fission, one of the two fundamental processes that make possible the atomic bomb as well as the harnessing of atomic energy for power. The other process involved is the liberation of neutrons in sufficient number to maintain a chain reaction.

To reassure his audience that the day has not yet come when atomic bombs could be made with common elements such as lead and bismuth, Dr. Seaborg emphasized that the fission of these common elements "opens no possibility for the production of self-sustaining chain reaction," and that "there is no possibility for their employment as sources of atomic energy."

"One reason for this," he said, "stems from the fact that any secondary emitted particles which might conceivably be eligible for perpetuating such a chain reaction have much too small an energy to be able to do so."

It took neutrons of 100,000,000 electron-volt energies, and deuterons (nuclei of double weight hydrogen) of 200,000,000 electron volts, produced in the giant 184-

inch cyclotron in the University of California to split the bismuth, lead and thallium, he reported, while it took 400,000,000 electron volt nuclei of helium atoms to split tantalum and platinum. The particles liberated in the splitting of these elements could not sustain a chain reaction.

Mankind may heave a sigh of relief that such is the case, for the very existence of civilization may depend on the fact that the fission of lead cannot maintain a chain reaction and thus provide cheap atomic bombs for any would-be world conqueror. However, Dr. Seaborg pointed out, "this reaction serves to give us another look at the ways in which nuclear constituents can rearrange themselves."

The fission of the lead and the other lighter-than-uranium elements was accomplished by Drs. F. Perlman, R. H. Goeckermann, D. H. Templeton and J. J. Howland.

Bombarding other elements with 200,000,000-volt deuterons or 400,000,000 helium nuclei, physicists at the University of California also have succeeded in splintering, or "spallating" atoms of common elements to a degree never dreamed of before, Dr. Seaborg reported. Drs. H. H. Hopkins and B. B. Cunningham bombarded arsenic with 400,000,000-volt helium nuclei and transmuted the arsenic into a number of new elements, one of which is a new isotope of chlorine of atomic weight 38. Since arsenic contains thirty-three positively charged particles (protons) in its nucleus, while chlorine has only seventeen, this means that the bombardment has knocked fully sixteen protons out of the arsenic nucleus. This means, in effect, that the arsenic nucleus also has been split.

In another example, Drs. Perlman and M. Lindner bombarded antimony (nucleus of 51 protons), with 200,000,000 deuterons, and produced radioactive isotopes extending from molybdenum (42 protons) to tellurium (52 protons), and the observations are still far from complete.

This process of splintering atoms, to which the new name "spallation" is given (to distinguish it from fission) is expected to add at least a hundred new radioactive isotopes to the more than 500 already produced, Dr. Seaborg said. In the case of the "spallation" reaction, he said, "many neutron-deficient isotopes are formed, thus

making it possible to enter the region of isotopes that emit positrons (positive electrons) in much the same way that the fission-produced isotopes have widened the area of isotopes that emit negative electrons."

Steps Toward Creating Matter

This is the beginning of the new phase of nuclear development, Dr. Seaborg told the chemists. The next phase is to create machines that develop such high energies that man at last will be able to create matter out of energy, thus reversing the process of the atomic bomb, in which matter is converted into energy.

Already, he said, plans are under way to make certain fundamental changes in the 184-inch cyclotron (largest in the world) next year to make it possible to accelerate protons to about 350,000,000 electron-volts of energy. With these, it is hoped to create mesotrons, particles observed at present only in the cosmic radiation.

"When it should be possible to accelerate particles to the energy region of billions of electron volts," he added, "it may be possible to use this kinetic energy to synthesize neutrons and protons and thus truly to create matter from energy."

Since these particles might be born in pairs, he pointed out, it may be possible to create pairs of positive and negative protons. So far no negative protons have been found to exist in nature.

"Highly advanced machines are under consideration and even have entered the stage of preliminary design," Dr. Seaborg said, "for the acceleration of particles to these fantastic energies."

"Among these may be listed a machine conceived by Dr. W. M. Brobeck of the University of California, and one being planned for inclusion among the group which is being built by the Brookhaven National Laboratory at Camp Upton, L. I., for the Atomic Energy Commission.

"In these, both the frequency with which the accelerating potential is applied and the strength of the magnetic field is varied as the particle gains successive increments of energy while it repeatedly travels around a fixed orbit.

"Apparently the prospects for entering this next energy region are good. Thus we may look forward to even more amazing developments in the fields of nuclear science."

Professor Seaborg was one of seven chemists honored last night. The Priestly Medal, highest honor in American chemistry, was presented to Prof. Warren K. Lewis of the Massachusetts Institute of Technology. Prof. Mary Lura Sherrill, head of the department of chemistry at Mount Holyoke College, received the Francis P. Garvan Medal honoring women in chemistry. The new \$3,000 Ipatieff Prize was conferred upon Dr. Louis Schmerling of the Universal Oil Products Company, Chicago, for his work in the field of catalysis.

Prof. Van R. Potter of the McArdle Memorial Laboratory for Cancer Research, University of Wisconsin Medical School, received the Paul-Lewis Laboratories Award in enzyme chemistry, consisting of \$1,000 and a bronze medal.

Dr. Sidney P. Colowick of the Public Health Research Institute of the City of New York, won the \$1,000 Eli Lilly & Co. Prize. Dr. George C. Supplee of Bainbridge, N. Y., received the Borden Company Prize of \$1,000 and a gold medal for his research in the chemistry of milk.

This Clipping From
NEW YORK, N. Y.
TIMES
SEP 17 1947

MATTER FROM ENERGY

Let any physicist speak of fission, a term used in biology for many a decade without raising any fear, and the newspaper reader thinks of chain-reactions, the release of atomic energy, coalless power plants and bombs. So it was when Dr. Glenn T. Seaborg in his address before the American Chemical Society paid a tribute to his University of California colleagues who had split bismuth, lead, thallium, platinum, tantalum and arsenic. If there was any thought of transmuting any of these into material for atomic bombs Dr. Seaborg throttled it at once by pointing out that a chain-reaction is impossible. Hence these additions to the short list of elements that can be split is of no military or engineering significance.

Dr. Seaborg dwelt more on the scientific implications of what has been achieved in California and therefore on the ignorance of physicists and the problems that still confront them. It is not yet known what holds the atom together. The forces involved are far more powerful than gravitation, which fact explains why hundreds of millions of volts are necessary to split or splinter an atom. Without detracting anything from the credit that must go to the Californians for their achievement it must be recognized that nothing could have been accomplished without the colossal cyclotron of the University of California. That machine promises to deliver energies comparable with those of the cosmic rays, and when it does we shall know more about the elusive, fleeting mesotron which is associated with the rays and which probably plays some part in holding the nucleus of every atom together.

What especially fascinates Dr. Seaborg and other physicists is a further application of the famous Einstein mass-energy equation. According to that equation, mass can be converted into energy, as we see in the atomic bomb, and energy into mass, which we have not yet seen on any large scale. If energies running into the billions of volts are developed, which is feasible with the newer machines, physicists may be able to synthesize neutrons and protons, suggests Dr. Seaborg, and hence to create matter out of energy. He has himself re-created a few short-lived radioactive elements that "died" hundreds of millions of years ago and

This Clipping from
LOUISVILLE, KY.
COURIER-JOURNAL

SEP 16 1947

Matter Creation From Energy Is Predicted

Giant Successors To Cyclotron Hinted

New York, Sept. 15 (AP)—Scientists in the not-to-distant future may succeed in creating matter out of energy, Prof. Glenn T. Seaborg of the University of California, a codiscoverer of plutonium, predicted tonight.

This may come, he said, through more powerful machines for bombarding atoms, machines that would be giant successors to present cyclotrons. Some of these new machines now are in the preliminary-design stage.

Dr. Seaborg based his prediction on progress made in smashing atoms at the University of California, describing experiments there in which 20 to 30 to 40 particles have been knocked off atoms of target materials. The bombardments changed the target elements into other elements, and also produced many radioactive substances.

Dr. Seaborg addressed a dinner meeting of the American Chemical Society after receiving the society's \$1,000 award in pure chemistry, given by Alpha Chi Sigma, the national chemical fraternity, for his achievements in nuclear science.

so turned back the hands of the geological clock. But these are the end-products of what are almost old-fashioned transmutations of known elements. Now Dr. Seaborg proposes that elements be synthesized that nature overlooked. To congeal energy into something harder than the diamond, more radioactive than radium—even the most brilliant achievements of synthetic chemistry or the fission of uranium seem pallid in comparison.

This Clipping From
CLEVELAND, OHIO
PLAIN DEALER
SEP 16 1947

PREDICTS MATTER MADE OF ENERGY

Plutonium Co-Discoverer Calls It Possible

NEW YORK, Sept. 15 (AP)—Scientists in the not too far distant future may succeed in creating matter out of energy, Prof. Glenn T. Seaborg of the University of California, a co-discoverer of plutonium, predicted tonight.

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Dr. Seaborg addressed a dinner meeting of the American Chemical Society after receiving the society's \$1,000 award in pure chemistry, given by the national chemical fraternity Alpha Chi Sigma for his achievements in nuclear science.

This Clipping From
BUFFALO, N. Y.
NEWS

SEP 17 1947

This Clipping From

Buffalo N.Y.
Courier

SEP 16 1947

ATOMS OF 5 MORE ELEMENTS ARE SPLIT

NEW YORK, Sept. 17 (INS).—The American Chemical Society today considered a report that the atoms of five more elements have been split.

Prof. Glenn T. Seaborg, University of California chemist, co-discoverer of plutonium, americium and curium, in his report Monday night to the 112th national meeting of the society said the latest atoms to be split are lead, bismuth, thallium, platinum and tantalum. He said that such common elements as lead and bismuth cannot at this time be used in the making of atomic bombs or as sources of atomic energy.

"The fission of these common elements opens no possibility for the production of self-sustaining chain reaction, one reason for this stems from the fact that any secondary emitted particles which might be eligible for chain reaction have much too small an energy to do so," he added.

Scientist Says Mystery Of World Near Solution

Seaborg Envisions Discovery of Binding Force That Holds All Atoms Together

New York, Sept. 15 (UP)—Prof. Glenn T. Seaborg, famed physicist of the University of California, said tonight that science is entering the threshold of an era that may lead to solving the mystery of what holds the world together as one big atom.

Seaborg, co-discoverer of Plutonium and a member of the general advisory committee of the United States Atomic Energy Commission, was one of those honored at the 112th national meeting of the American Chemical Society. He received the \$1,000 award in pure chemistry, given by Alpha Chi Sigma, national fraternity, for his achievements in nuclear science.

He said the "new phase" in nuclear science was "coming right on the heels of the amazing atomic energy development," and that "we may look forward to even more amazing developments."

Among these "amazing developments," he disclosed, may come the artificial production of mesotrons, known to be part of

the mysterious cosmic rays that come from far out in space; the conversion of energy back into mass, or matter, and new light on the mystery of what holds the nucleus of the atom together.

The atom is composed of protons, neutrons and electrons, with protons and neutrons forming the nucleus. Electrons, with a negative charge, are the "cover" of the nucleus. They are held in place because of the positively charged protons. Opposite charges attract each other. The mystery is what holds the protons and the neutrons together in the nucleus, as there is no apparent attraction there.

New Machines Planned

Some scientists believe that the mesotrons coming with natural cosmic radiation may be the binding force in the nucleus of the atom, but this theory has been all but discarded.

Seaborg recalled the new accelerating machines that can "remodel" atoms by bombarding them with great electrical bullets, and said that even more powerful machines, capable of producing many millions, and possibly billions

of electron volts, are now under construction or being planned.

"It may be possible," he said, "with such energies to create mesotrons by artificial means for the first time."

He estimated that mesotrons should be produced in a machine accelerating more than 200,000,000 electron volts.

Mesotron Key to Mystery

"The mesotron plays an important role in the current theories of nuclear structure in that it is supposed to be intimately involved in the very fundamental interaction between neutrons and protons through which they are held together to create a nucleus," he said. "It is therefore hoped that their study as a result of their production in quantity by artificial means might give just the key which is needed to the fundamental understanding of the nucleus of the atom."

He said that "some results" already had resulted through use of the betatron at Schenectady and the 184-inch synchrocyclotron at Berkeley, Cal.

Prof. Seaborg also said that such experiments would not cause a self-sustaining nuclear chain, such as the atomic bomb, and "there is no possibility for their employment as sources of atomic energy."

It may be possible, however, he said, to "synthesize neutrons and protons and thus truly to create matter from energy." In the case of the atomic bomb, it was just the reserve — creating energy from mass.

HEAVIEST KNOWN ELEMENT
SEEN FOR FIRST TIME

9/17/47 W

By WATSON and HELEN DAVIS
Science Service Writers

NEW YORK, Sept. — The human eye has seen for the first time the heaviest and most violently radioactive of the chemical elements, curium, number 96 in the atomic table.

Isolation of curium was announced by Dr. Isadore Perlman, of the University of California, to the American Chemical Society.

The world's total supply, barely visible to the unaided eye, is a speck of a whitish-yellowish hydroxide that bubbles and glows softly with radioactivity.

It transmutes itself at the rate of one-half per cent a day into the atom-bomb element, plutonium. It is the most dangerous of all the elements to handle.

Chemists hailed its isolation by L. B. Werner as one of chemistry's most difficult separations because curium is so like americium, element 95, from which it was made by intense neutron bombardment in the atomic pile.

Not content with creating elements unknown in nature and converting matter into atomic energy, scientists are planning to make high-voltage machines of such power that energy can be converted into matter.

Ten-billion electron-volt accelerators are on the drawing boards at both the University of California and the Brookhaven National Laboratory on Long Island. Dr. Glenn T. Seaborg, plutonium discoverer, told the chemists that these, when built, should produce kinetic energy sufficient to synthesize neutron and proton particles and thus truly create matter from energy.

Explaining that the world's largest cyclotron at Berkeley ~~has~~ smashed atoms into many pieces by its new high energies, Dr. Seaborg christened this new process "spallation", to distinguish it from the now famous fission of atoms in the atomic bomb.

A new way of indexing scientific knowledge which increases many billion times the ability of a sorting card to carry and produce information was announced to the chemists by Calvin N. Mooers of the Zator Company, Cambridge, Mass.

Applying the mathematical principles of random numbers to this urgent problem of classifying facts of all sorts, the new Zato

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9/17/47 W

carding makes possible a new type of literature organization unhampered by any sort of pre-set classification.

Instead of having to devise a classification in advance that encompasses all future details, the random numbers system devised by Mr. Mooers builds its subject headings as needed and brings as many subjects as desired into mechanical relationship.

An individual scientist can use this method in arranging his research and literature notes, it was explained, or a large chemical concern can apply it to its library and information files.

"All sorts of information can be filed successfully in the same file," Mr. Mooers claimed. "The wife may even file her recipes and future social engagements in the same card file as her scientist-husband's chemical formulae without any conflict or mixup whatever."

Curium, a New Man-Made Metal ^{S.F. Chronicle} U. C. Isolates Radioactive Element 96 ^{9/17/47}

By ALTON L. BLAKESLEE

Associated Press Science Reporter

NEW YORK, Sept. 16—A strange new metal that seethes and bubbles and emits a soft glow was described for the first time today to the American Chemical Society.

This metal is curium, element 96, the heaviest known element. It is man-made, it no longer exists in nature, and is the most violently radioactive solid ever isolated.

Professor Isadore Perlman of the University of California department of chemistry and radiation laboratory announced that a tiny amount of curium, smaller than a grain of sand, had been produced for the first time in pure form. There is just enough to see it with the naked eye. And this sand-grain amount now represents the total world supply of it.

Curium is one of the four man-made metals discovered during the atom bomb project. The others are plutonium, the super explosive for atom bombs; americium and neptunium.

All four probably existed naturally on earth millions of years ago when the planet was younger, and much hotter. But because of their radioactivity they broke down or decayed into other elements.

This tiny bit of pure curium has

a slight yellowish cast, Dr. Perlman said. It is kept in a solution, and it tears apart the hydrogen and oxygen in the water, making these gases bubble off.

If enough of the curium were concentrated, Dr. Perlman said, it would probably melt by itself. It would be warm to touch. But touching it might be fatal. Even if an extremely tiny amount entered the body it would cause eventual death due to its extreme radioactivity, Dr. Perlman said.

No uses are yet foreseen for curium, partly because of the terrific difficulty of making it in quantity.

The sand-grain piece of curium is dying rapidly. In 57 days half of it disappears, then in another 57 days half that remainder is gone. In one minute's time a millionth of a gram of curium emits 70,000,000,000 alpha particles, or electrically charged helium ions, Dr. Perlman said.

The curium breaks down or decays into plutonium. All these radioactive materials decay to elements of lower atomic weight, and eventually into lead.

The tiny bit of curium was produced by the Atomic Energy Com-

mission in one of its atomic ovens, through bombardment for many months of americium with neutrons, Dr. Perlman said.

Then it was prepared in pure form at the University of California by L. B. Warner working with Dr. Perlman.

Splitting of atoms of lead, osmium, thallium, platinum and tantalum by man-made electrical energies was described by Dr. Glenn T. Seaborg.

This splitting, although it resembles the splitting of uranium and plutonium in atom bombs, is of no practical use for bombs or otherwise.

The energy released by splitting lead and the other atoms is tremendous, but the energy that is emitted is not enough to split another nearby atom. In the bomb metals a single atom splitting causes others nearby to break in two and so inaugurates a chain reaction which makes an explosion or gives heat.

The new splits were made in the University of California cyclotron, which drives atomic particles (fractions of atoms) at speeds of thousands of miles a second.

This Clipping From
KENTON, O.
DAILY DEMOCRAT

SEP 18 1947

New Atoms Split



ANNOUNCEMENT that atoms of lead, bismuth, platinum and tantalum have been split for the first time was made before the American Chemical Society Convention in New York by Prof. Glenn T. Seaborg, of the University of California in Berkeley. Dr. Seaborg, co-discoverer of plutonium, received a \$1,000 award. (International)

This Clipping From
GLENS FALLS, N. Y.
TIMES

SEP 18 1947

The New York Times Says:

MATTER FROM ENERGY

Let any physicist speak of fission, a term used in biology for many a decade without raising any fear, and the newspaper reader thinks of chain-reactions, the release of atomic energy, coalless power plants and bombs. So it was when Dr. Glenn T. Seaborg in his address before the American Chemical Society paid a tribute to his University of California colleagues who had split bismuth, lead, thallium, platinum, tantalum and arsenic. If there was any thought of transmuting any of these into material for atomic bombs Dr. Seaborg throttled it at once by pointing out that a chain-reaction is impossible. Hence these additions to the short list of elements that can be split is of no military or engineering significance.

Dr. Seaborg dwelt more on the scientific implications of what has been achieved in California and therefore on the ignorance of physicists and the problems that still confront them. It is not yet known what holds the atom together. The forces involved are far more powerful than gravitation, which fact explains why hundreds of millions of volts are necessary to split or splinter an atom. Without detracting anything from the credit that must go to the Californians for their achievement it must be recognized that nothing could have been accomplished without the colossal cyclotron of the University of California. That machine promises to deliver energies comparable with those of the cosmic rays, and when it does we shall know more about the elusive, fleeting mesotron which is associated with the rays and which probably plays some part in holding the nucleus of every atom together.

What especially fascinates Dr. Seaborg and other physicists is a further application of the famous Einstein mass-energy equation. According to that equation, mass can be converted into energy, as we see in the atomic bomb, and energy into mass, which we have not yet seen on any large scale. If energies running into the billions of volts are developed, which is feasible with the newer machines, physicists may be able to synthesize neutrons and protons, suggests Dr. Seaborg, and hence to create matter out of energy. He has himself re-created a few short-lived radioactive elements that "died" hundreds of millions of years ago and so turned back the hands of the geological clock. But these are the end-products of what are almost old-fashioned transmutations of known elements. Now Dr. Seaborg proposes that elements be synthesized that nature overlooked. To congeal energy into something harder than the diamond, more radioactive than radium—even the most brilliant achievements of synthetic chemistry or the fission of uranium seem pallid in comparison.

This Clipping From
LAFAYETTE, IND.
JOURNAL-COURIER

SEP 18 1947

Science Entering New Atomic Era

NEW YORK. (UP)—Prof. Glenn T. Seaborg, famed physicist of the University of California, that science is entering the threshold of an era that may lead to solving the mystery of what holds the world together as one big atom.

Seaborg, co-discoverer of plutonium and a member of the General Advisory committee of the United States Atomic Energy commission, was one of those honored by the 112th national meeting of the American Chemical Society. He received the \$1,000 award in pure chemistry, given by Alpha Chi Sigma, national chemical fratern-

nity, for his achievements in nuclear-science.

AMAZING DEVELOPMENTS

He said the "new phase" in nuclear science was "coming right on the heels of the amazing atomic energy development," and that "we may look forward to even more amazing developments."

Among these "amazing developments," he disclosed, may come the artificial production of mesotrons, known to be part of the mysterious cosmic rays that come from far out in space; the conversion of energy back into mass, or matter, and new light on the mystery of what holds the nucleus of the atom together.

The atom is composed of protons, neutrons and electrons, with protons and neutrons forming the nucleus. Electrons, with a nega-

tive charge, are the "cover" of the nucleus. They are held in place because of the positively charged protons. Opposite charges attract each other. The mystery is what holds the protons and the neutrons together in the nucleus as there is no apparent attraction there.

Some scientists believe that the mesotrons coming with natural cosmic radiation may be the binding force in the nucleus of the atom, but this theory has been all but discarded.

Seaborg recalled the new accelerating machines that can "re-model" atoms by bombarding them with great electrical bullets, and said that even more powerful machines, capable of producing many millions, and possibly billions of electron volts, are now under construction or being planned.

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This Clipping From

DAYTON, O.

NEWS

SEP 19 1947

Atom-Smasher Of Billion Volts May Create Matter

BY THOMAS R. HENRY

NEW YORK, Sept. 19—(NANA)

—Billion-volt atom smashers with five times the "punch" of an exploding uranium atom, already are in the design stage.

They may enable man to create matter out of energy, just as matter is converted into energy in the atomic bomb explosion.

Science then will be able to duplicate on a small scale the processes by which the basic particles of matter—protons, electrons and neutrons—are created in the cosmos.

This startling development of the not-too-distant future, which will mean entrance into an energy realm about as far above that of the plutonium explosion as that was above any form of energy known in the past, was predicted before the American Chemical Society here by Dr. Glenn T. Seaborg of the University of California, who is credited with the first production of plutonium five years ago.

One machine calculated to accelerate primary particles such as neutrons with forces exceeding a billion electron volts is planned for the Brookhaven Laboratory of the Atomic Energy Commission located at the former site of Camp Upton, L. I. Another has entered the stage of preliminary design at the University of California. Both are on the basic cyclotron pattern, but with far greater potentialities than anything now in existence.

ALL THIS WILL MEAN. Dr. Seaborg pointed out, that man will enter a new area of energy beyond that of atomic fission which stops at about 200,000,000 electron volts—a stage at which only the disintegration of matter on a limited scale is possible.

Under the law of mass-energy equivalence first proposed by Prof. Albert Einstein and applied in the atomic bomb, matter is energy at rest in the form of nuclear particles. A very minute amount of this matter becomes energy again in the nuclear explosion of the atomic bomb.

The great difficulty in reversing the process comes from the enormous amount of energy required. Thus, Dr. Seaborg declared, a single neutron or proton, the particles making up the atomic nucleus, is the mass equivalent to about a billion volts. In nature they apparently are produced only in pairs—so at least 2,000,000,000 volts would be required. It might be necessary to accelerate particles with a force of close to 3,000,000,000 volts before any actual conversion of energy to mass could be expected, he believes.

One conversion of this kind, however, may be close at hand. Cosmic rays, entering the earth's outer atmosphere with energies hitherto unduplicable on earth, produce mysterious material particles known as mesotrons. They are about 200 times the mass of electrons and, after they are created, persist as matter for only about a billionth of a second. They presumably are the most unstable of all forms of matter.

The cosmic rays which produce these, Dr. Seaborg said, fall in an energy range of only a few hundred million electron volts, and changes now are planned in the 184-inch cyclotron at the University of California so that it will accelerate neutrons with such force. This would be about double the force needed to split an atom of uranium or plutonium.

DR. SEABORG SAW no immediate practical value in the forthcoming probable creation of matter, other than a better understanding of atomic structures. But the very fact that it could be accomplished would mean that man had a power which has not existed on earth and is known only from the emanations of the milky way impinging on the planet's outer atmosphere.

SEP 19 1947

MAN MAY CONVERT ENERGY TO MATTER

Billion-Volt Atom Smasher in Design Also Seen Changing Mercury Into Gold

North American Newspaper Alliance.

NEW YORK, Sept. 18—Billion-volt atom smashers with five times the "punch" of an exploding uranium atom, already are in the design stage.

They may enable man to create matter out of energy, just as matter is converted into energy in the atomic bomb explosion.

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2 New Machines

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Most Unstable Matter

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New Isotopes

The progress toward, more powerful atom smashers, he pointed out, already has brought astounding results. Within the past few months it has made possible the production of about 100 new isotopes, hitherto nonexistent forms of familiar elements, whose uses are not yet explored. With a 400,000,000 electron volt bombardment at the University of California, Dr. Seaborg continued, it has been possible to change arsenic into chlorine. With a billion-volt atom smasher, it will be just as simple to convert mercury into gold, or vice versa.

Until very recently the actual splitting of atoms has been confined to the radioactive elements—uranium, thorium and actinium—and the artificially produced plutonium. The new atom smashers, however, have caused fission of bismuth, lead, thallium, platinum and tantalum. This does not mean, Dr. Seaborg warned, a new source of atomic power because each atom must be split separately. No chain reaction is set up, as in the case of plutonium. The new machines also, he explained, have made possible the multiple splitting of the radioactive elements. In the uranium fission reaction of the atomic bomb, the atom is split only into two pieces of about equal size—usually constituting the element

barium and something quite close to it in the atomic table. Now a single uranium atom can be split into 15 or 20 fragments. Here again no means is known of continuing this as a chain reaction.

9/21/47

This Clipping From
YAKIMA, WASH.
MORNING HERALD
SEP 21 1947

World Cohesion Mystery Tapped

By PAUL F. ELLIS
New York, Sept. 15 — (UP) - Prof. Glenn T. Seaborg, famous physicist at the University of California, said tonight that science is entering the threshold of an era that may lead to solving the mystery of what holds the world together as one big atom.

Seaborg, co-discoverer of plutonium and a member of the general advisory committee of the United States Atomic Energy Commission, was one of those honored by the 112th national meeting of the American Chemical Society. He received the \$1,000 award in pure chemistry, given by Alpha Chi Sigma, national chemical fraternity, for his achievements in nuclear science.

New Phase Coming

He said the "new phase" in nuclear science was "coming right in the heels of the amazing atomic energy development," and that "we may look forward to even more amazing developments."

Among these "amazing developments," he disclosed, may come the artificial production of mesotrons, known to be part of the mysterious cosmic rays that come from far out in space; the conversion of energy back into mass, or matter, and new light on the mystery of what holds the nucleus of the atom together.

The atom is composed of protons, neutrons and electrons, with protons and neutrons forming the nucleus. Electrons, with a negative charge, are the "cover" of the nucleus. They are held in place because of the positively charged protons. Opposite charges attract each other.

Mystery Appears

The mystery is what holds the protons and the neutrons together in the nucleus as there is no apparent attraction there.

Some scientists believe that the mesotrons coming with natural cosmic radiation may be the binding force in the nucleus of the atom, but this theory has been all but discarded.

Seaborg recalled the new accelerating machines that can "remodel" atoms by bombarding them with great electrical bullets, and said that even more powerful machines, capable of producing many millions, and possibly billions of electron volts, are now under construction or being planned.

"It may be possible," he said, "with such energies to create mesotrons by artificial means for the first time."

SEP 22 1947

Alice Hughes

At the Hotel Pennsylvania where only a few weeks ago American Legion pranksters were tossing paper-water bags out of the windows, this week the American Chemical Society is in dignified session. For the first time, this society announces, lead, bismuth, thalium, platinum and tantalum atoms have been split, thus leading to a new phase of man's mastery of the atom.



This will help heat our homes, run power machinery and fight disease. But it will not lessen the housewife's drudgery, says Glenn T. Seaborg, famed chemistry professor of the U. of California, where atom splitting was an early project. "It will be many years before the atom is harnessed in favor of the little woman in the kitchen," said the professor in an interview.

From another source in this chemical society meeting comes the possibility of longer life. Dr. Thom as Gardner, head scientist of a large pharmaceutical firm in New Jersey, says we may live longer by eating the same food queen bee eat in the hive. Fruit flies that Dr Gardner has been feeding this mixture live 46% longer than those who do without. The queen bee herself has a life span of five years: The worker bee, who is not fed an of the royal honey which the queen eats, lives only three months. The name of this regal food is "Kelly and Dr. Gardner makes the implication that, although he has not yet tried it on people, it is quite possible that such a diet might prolong human life. Will it give us hives, professor?

We're already living longer than our ancestors by reaching an average age somewhere in the 60's. But the mere act of living till 80 fails to be attractive unless with it come the guarantee of an active mind even if the body is slowed up. Old age can be wonderful if there is mental and physical ease and no problem for those with whom oldsters live. On the other hand there is no torture greater than year which are a burden rather than boon. Aging gracefully is far more desirable than living a long, long time. I recall a fascinating novel by Aldous Huxley called "After Many a Summer Dies the Swan" in which an abysmally old couple stays alive by eating the viscera of carp. The spark of life is there but they think and act like monkeys. If that's what the queen bee die may do to us, professor, take it away!

Atoms Of 5 More Elements Have Been Split Professor Informs Chemical Society

By JAMES WALSH

International News Service Staff Correspondent

NEW YORK, Sept. 22—The American Chemical Society, after hearing a startling report that the atoms of five more elements have been split, is going ahead to consider a cheap new process for making synthetic gasoline and oil.

Prof. Glenn T. Seaborg, famed University of California chemist, co-discoverer of plutonium, americium and curium, told the 112th National Meeting of the society meeting here that he latest atoms to be split are lead, bismuth, thalium, platinum and tantalum.

He advised the eleven thousand chemists gathered from all sections of the country that such common elements as lead and bismuth cannot at this time be used in the making of atomic bombs or as sources of atomic energy. He said:

"The fission of these common elements opens no possibility for the production of self-sustaining chain reaction. One reason for this stems from the fact that any secondary emitted particles which might be eligible for chain reaction have too small an energy to do so. Soviet scientists, aided by Scandinavian physicists, recently were reported seeking a cheap atomic source from lead."

Prof. Seaborg was given \$1000

ACS Award in pure chemistry for his achievement in nuclear science

The chemists were given a description of a new process which utilizes low-grade coal and lignite as raw materials for synthetic gasoline and oil.

According to report by V. F. Parry, E. O. Wagner, A. W. Koth, and B. J. Goodman of the United States Bureau of Mines, Golden, Colorado, synthetic gas that can be converted directly into synthetic liquid fuels, can now be generated into a continuous stream without the use of relatively expensive pure oxygen.

The report continued:

"The new process has several applications through which a gas suitable for domestic purposes can be made efficiently in small plants by removing the carbon dioxide impurities."

Dr. Alfred Russell of the United States Department of Agriculture, Peoria, Ill., announced that annual waste of millions of tons of lignin, a major constituent of wood, may be halted through synthesis of this raw material.

He explained that the 38 million tons of lignin, which are obtained each year as a by-product, are for the most part discarded as waste. Dr. Russell disclosed:

"Exploitation of lignin as a raw material could not only conserve other scarcer natural resources, but also lower the prices of lumber, paper, and other wood products."

In another report, W. V. Cruess and John H. Kilbuck of the University of California, revealed that mellow, fruitier and clearer wines

are obtained by enriching grapes with additional fruit enzymes.

The report said that wine, which has had pectinol, a commercial enzyme, added to it to accelerate its clearing, unexpectedly developed a fruitier flavor and materially hastened the disappearance of the green flavor of new wines.

SEP 25 1947

Atom Smasher May Turn Energy Into Solid Matter

By THOMAS R. HENRY

New York, Sept. 24 (NANA)—Billion-volt atom smashers with five times the "punch" of an exploding uranium atom, already are in the design stage.

They may enable man to create matter out of energy, just as matter is converted into energy in the atomic bomb explosion.

Science then will be able to duplicate on a small scale the processes by which the basic particles of matter—protons, electrons and neutrons—are created in the cosmos.

This startling development of the not too-distant future, which will mean entrance into an energy realm about as far above that of the plutonium explosion as that was above any form of energy known in the past, was predicted before the American Chemical Society here tonight by Dr. Glenn T. Seaborg of the University of California, who is credited with the first production of plutonium five years ago.

ONE MACHINE calculated to accelerate primary particles such as neutrons with forces exceeding 1,000,000,000 electron volts is planned for the Brookhaven laboratory of the Atomic Energy Commission located at the former site of Camp Upton, Long Island. Another has entered the stage of preliminary design at the University of California. Both are on the basic cyclotron pattern, but with far greater potentialities than anything now in existence.

All this will mean, Dr. Seaborg pointed out, that man will enter a new area of energy beyond that of atomic fission which stops at about 200,000,000 electron volts—a stage at which only the disintegration of matter on a limited scale is possible.

Under the law of mass-energy equivalence first proposed by Prof. Albert Einstein and applied in the atomic bomb, matter is energy at rest in the form of nuclear particles. A very minute amount of this matter becomes energy again in the nuclear explosion of the atomic bomb.

THE GREAT difficulty in reversing the process comes from the enormous amount of energy required. Thus, Dr. Seaborg declared, a single neutron or proton, the particles making up the atomic nucleus, is the mass equivalent to about 1,000,000,000 volts. In nature they apparently are produced only in pairs—so at least 2,000,000,000 volts would be required. It might be necessary to accelerate particles with a force of close to 3,000,000,000 volts before any actual conversion of energy to mass could be expected, he believes.

One conversion of this kind, however, may be close at hand. Cosmic rays, entering the earth's outer atmosphere with energies hitherto unduplicable on earth, produce mysterious material particles known as mesotrons. They are about 200 times the mass of electrons and, after they are created, persist as matter for only about a billionth of a second. They presumably are the most unstable of all forms of matter.

THE COSMIC RAYS which produce these, Dr. Seaborg said, fall in an energy range of only a few hundred million electron volts, and changes now are planned in the 184-inch cyclotron at the University of California so that it will accelerate neutrons with such force. This would be about double the force needed to split an atom of uranium or plutonium. Dr. Seaborg saw no immediate practical value in the forthcoming probable creation of matter, other than a better understanding of atomic structures. But the very fact that it could be accomplished would mean that man had a power which has not existed on earth and is known only from the emanations of the Milky Way impinging on the planet's outer atmosphere.

THE PROGRESS toward more powerful atom smashers, he pointed out, already has brought astounding results. Within the last few months it has made possible

the production of about 100 new isotopes, hitherto nonexistent forms of familiar elements, whose uses are not yet explored. With a 400,000,000 electron-volt bombardment at the University of California, Dr. Seaborg continued, it has been possible to change arsenic into chlorine. With a 1,000,000,000-volt atom smasher it will be just as simple to convert mercury into gold, or vice versa.

Until recently the actual splitting of atoms has been confined to the radioactive elements—uranium, thorium and actinium—and the artificially produced plutonium. The new atom smashers, however, have caused fission of bismuth, lead, thallium, platinum and tantalum. This does not mean, Dr. Seaborg warned, a new source of atomic power because each atom must be split separately. No chain reaction is set up, as in the case of plutonium. The new machines also, he explained, have made possible the multiple splitting of the radioactive elements. In the uranium fission reaction of the atomic bomb, the atom is split only into two pieces of about equal size—usually constituting the element barium and something quite close to it in the periodic table. Now a single uranium atom can be split into 15 or 60 fragments. Here again no means is known of continuing this as a chain reaction.

Extra Energy. Radar waves are electromagnetic waves like light and X rays but since their frequency is enormously smaller, they carry much less energy per "photon."* They therefore provide what scientists call an "elegant" method of dealing out very small quantities of energy. Using a formidable-looking gadget (*see cut*), Lamb & Retherford shot radar waves of the proper frequency through hydrogen atoms in one of Dirac's predicted states. As soon as the energy was added, the atoms turned into the other state. Since energy was required to make the change, the experiment showed that the two states did not have the same energy originally. Therefore, Dirac's theory was proved incomplete.

Theoretical consequences might be enormous. The hydrogen atom, with its single proton and single electron, is the simplest atomic structure. It is therefore the starting point for investigation of the fundamental mysteries of matter. The atoms of other elements are more complicated, but presumably their constituent particles follow the same basic laws.

More Speed. The Lamb & Retherford experiment acted rather like an improved microscope, revealing fine details about the hydrogen atom which earlier and coarser methods had left unsuspected. Now scientists, equipped with a new road map, may move ahead with more boldness and speed. Perhaps they will find out things that no one knows at present: what electrons and protons—and even matter itself—really are.

Practical consequences are not yet in sight, for the wave mechanicians work in a never-never land far beyond the frontier of practical technology. But Nobelman Rabi compared Lamb & Retherford's criticism of the Dirac theory with Einstein's modification of Newton's laws of motion. It took 40 years for Einstein's relativity to grow into the atom bomb.

Nervous Elements

At the Manhattan meeting of the American Chemical Society last week, two novel elements made radioactive bows. One was man-made curium, No. 96 in the periodic table and the heaviest element known. The creation of curium was announced in 1945 (*TIME*, Nov. 26, 1945). But the element was not "isolated" (purified chemically) until recently. The world's total supply, prepared by Drs. Isadore Perlman and L. B. Werner of the University of California, is barely big enough to be seen with the naked eye.

No. 96. Like all the four known artificial elements,† curium is unstable. Each millionth of a gram shoots out 70 billion alpha particles (helium nuclei) per minute, 3,000 times as many as the same amount of radium. This activity makes a solution of curium hydroxide glow strongly enough to take its own photograph (*see cut*). Its "half-life" (the period

during which one half disintegrates) is only five months.

Curium can be made by bombarding plutonium with alpha particles, or americium with neutrons. Now that it has been isolated, the scientists working under the Atomic Energy Commission (the only ones privileged to play around with plutonium and its relatives) can try to build up an Element 97.

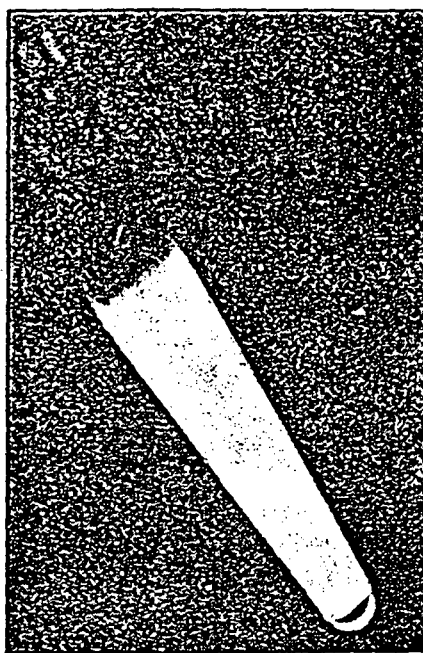
No. 61. Other element-hunters polished off some unfinished business. Two young nuclear chemists, J. A. Marinsky and L. E. Glendenin of M.I.T., announced that while working at Oak Ridge, Tenn. they had synthesized and isolated Element 61, thus filling the last gap in the periodic table. They had extracted the missing element from the miscellaneous "fission products" formed by uranium atoms splitting in the Oak Ridge pile, and

had also built it up by bombarding Element No. 60 (neodymium) with neutrons.

As a chemical element, No. 61 is not good for much; it is almost as unstable as curium. The longest-lasting of its two isotopes has a half-life of 3.7 years.

At the chemists' meeting last week, Dr. B. Smith Hopkins, 74, retired professor at the University of Illinois, rose to defend his priority on No. 61. In 1926, he insisted, he had found the element by observing its spectrum. Other experts testified that he must have made a mistake. Chief count against Dr. Hopkins' claim: Element 61 is so short-lived that it could hardly have existed in nature.

Until the question of priority is settled, Element 61 will have no official name. Dr. Hopkins has called it illinium. Mr. Glendenin wants to call it prometheum after



CURIUM (SELF-PORTRAIT)
Its half-life is five months.

the Greek god Prometheus, giver of fire. One convention was suggested grovesium, after loud-mouthed Major General Leslie R. Groves, military chief of the atom bomb project. Chemical symbol: Grr.

* The photon (smallest unit of radiant energy) is equal to the frequency of the wave multiplied by Planck's constant h (6.55×10^{-27} erg-seconds).

† The others: neptunium, No. 93; plutonium, No. 94; americium, No. 95.

TIME, SEPTEMBER 29, 1947

WINNERS OF AMERICAN CHEMICAL SOCIETY AWARDS

Awards will be presented at the General Meeting at 8:00 P.M. at Manhattan Center, 34th Street, just west of 8th Avenue. President N6yes will preside.



GLENN T. SEABORG
A. C. S. Pure Chemistry Award



LOUIS SCHMERLING
Ipatieff Award



SIDNEY P. COLOWICK
Eli Lilly Award



GEORGE C. SUPPLEE
Borden Award



MARY L. SHERRILL
Garvan Medal Award



VAN R. POTTER
Paul Lewis Labs. Award

ACS Award in Pure Chemistry



Seaborg

GLENN T. SEABORG
1947 AWARDEE

HEXAGON
9/47

Dr. Glenn T. Seaborg received the ACS Award in Pure Chemistry for 1947 at the 112th meeting of the Society in New York City this September. The Award consisted of a citation certificate from the Society and a \$1,000 check from A X Σ , the latter being presented by Foster Dec Snell, Alpha Nu, chairman of the fraternity's Pure Chemistry Award committee. Seaborg is the eighth recipient of the Award since its financial sponsorship by A X Σ which accepts voluntary subscriptions to the Award Fund from its professional (graduate) membership. Previous to A X Σ 's financial sponsorship, eight Awards had been made, the first in 1931 to Dr. Linus Pauling, Sigma. Awardees are selected by the ACS and the recipient must not be over 35 years of age. . . . Additional information about Dr. Seaborg appeared in May (1947) "Hexagon," page 299. He was inducted into A X Σ on March 30, 1935, as one of the charter members of Beta Gamma at UCLA.

The fraternity, through the "Hexagon," experiences a great deal of pleasure in congratulating Dr. Seaborg on this signal honor. It also congratulates the Professional Branch for its splendid support of the Award as represented by the current three year period (1946-47-48). The solicitation in 1946 yielded funds for four years instead of three.

A letter by Dr. Seaborg, forwarded to the "Hexagon," May 23, 1947, follows:

"The American Chemical Society Award in Pure Chemistry enjoys a status in the chemical world such as to make any young chemist proud to be chosen as its recipient. The features by which it is awarded for work in pure chemistry and to young men, of age not over 35 years, add greatly to the value of the Award. Since its inception it has served as a source of encouragement and inspiration for young research men at just that time in their career when this is most important. It is particularly appropriate to have an award of this type set aside for fundamental research because it is thus of broader service to science as a whole.

"I believe that the 1947 Award is a recognition of the chemist in the nuclear field of research. Much of the basic research work in this new field lies in the border-line areas between chemistry and physics and biology. It seems likely that much of the most fundamental future work will be done in these areas.

"Alpha Chi Sigma is performing a genuine service to chemistry in its backing of this Award and I believe that it can be proud that it is furthering in this way one of its principal aims—to strive for the advancement of chemistry both as a science and as a profession."

By Merle L. Griffin, G.P.A.

S. F. EXAMINER 11/13/48

SECOND MEDAL FOR SEABORG

For the second time in as many months Professor Glenn T. Seaborg, youthful University of California atomic scientist, yesterday received one of the nation's top scientific awards.

Granted him as the co-discoverer of plutonium, man-made source of atomic energy, was the William H. Nichols Medal of the New York Section of the American Chemical Society.

NAMED BY TRUMAN.

Professor Seaborg, who is 35, is a member of the nine-man advisory committee appointed by President Truman to assist the United States Atomic Energy Commission.

A month ago Seaborg received the \$1,000 American Chemical Society prize in pure chemistry for his general contributions to nuclear science.

CHEMIST OF YEAR.

In 1946 he was chosen "chemist of the year" in a nationwide poll of chemists and chemical engineers, conducted by the society.

A native of Ispeming, Mich., Seaborg received his bachelor of arts degree from UCLA in 1934 and his Ph.D. at Berkeley in 1937.

BERKELEY GAZETTE

Prof. Glenn Seaborg Awarded High Honor By Chemical Society

Prof. Glenn T. Seaborg of the University of California, co-discoverer of plutonium, man-made source of atomic energy, has been awarded the William H. Nichols Medal of the New York Section of the American Chemical Society for 1948, it was announced today.

Announcement of the award, one of the highest honors in chemical science, was made by Prof. Vincent du Vigneaud of the Cornell Medical College, chairman of the jury of award.

Prof. Seaborg, 35, received the award for his research on plutonium and his participation in the discovery of two americium and curium, two other new elements.



PROF. GLENN T. SEABORG
Receives Nichols Medal

Science Prize Won by Native of Ishpeming

Prof. Glenn T. Seaborg, native of Ishpeming, Mich., was named 1948 recipient of the William H. Nichols Medal of the New York Section of the American Chemical Society.

The award is one of the highest honors in chemical science.

* * *

HE WAS cited for his war-time research on plutonium (man-made source of atomic energy), his participation in the discovery of Elements 95 (americium) and 96 (curium and other artificially produced radioactive material).

Prof. Seaborg, 35, will receive the medal in March, 1948. He is a faculty member of the University of California.

MENOMINEE, MICH.
HERALD-LEADER

NOV 3 1947

U.P. MAN GETS SCIENCE HONOR

ISHPEMING —P— Prof. Glenn T. Seaborg, University of California facultyman and native of Ishpeming, will receive the William H. Nichols medal of the American Chemical Society's New York section in March 1948 for his wartime research in plutonium and artificially produced radioactive material. The award is one of the highest honors in chemical science.

11/3/47

U. C. Atom Scientist Honored

BERKELEY, Nov. 3 — New honors came today to Prof. Glenn T. Seaborg, 35-year-old University of California atomic scientist.

As co-discovered of plutonium, man-made source of atomic energy, Professor Seaborg yesterday was granted the William H. Nichols Medal of the American Chemical Society.

A month ago he received the \$1000 American Chemical Society prize in pure chemistry for his general contributions to nuclear science.

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This Clipping From
OAKLAND, CAL
POST-ENQUIRER

NOV 3 1947

OAK. POST-ENQUIRER

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Mills to Hear Prof. Seaborg

11/4/48

BERKELEY GAZETTE

Dr. Glenn T. Seaborg, world famous nuclear scientist in the radiation laboratories at the University of California, will speak on Peacetime Applications of Atomic Energy at the Tuesday morning assembly in Lisser Hall at Mills College. President White of Mills will introduce the speaker. The assembly will be held at 11 a.m. and is open to the public.

Co-discoverer of five elements—plutonium, americium, neptunium, curium and uranium—the young California scientist at present is working on the transuranium elements and on the identification of nuclear reactions resulting from the operation of the 184-inch cyclotron.

Holder of the 1947 award in pure chemistry from the American Chemical Society, Dr. Seaborg has just been named recipient of the

1948 research medal from the New York section of the American Chemical Society.

Dr. Seaborg to Speak

Dr. Glenn T. Seaborg, famed University of California nuclear scientist, will speak on Peacetime Applications of Atomic Energy at Mills College, November 11 at 11 a. m. The address will be open to the public.

The American-Swedish News Exchange, Inc.

Founded 1921, Incorporated 1927

630 Fifth Avenue, New York, N.Y.

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NEWS from SWEDEN

RELEASE NO. 309

NOVEMBER 5, 1947

RELEASE NO. 309

11/5/47

PAGE NO. 2

Sweden and the Dollar Crisis

(From an editorial in the Baltimore Evening Sun of October 25, 1947.)

"The dollar crisis affecting all sixteen nations represented at the recent Paris economic conference has not spared the hard-working Swedes. The country possesses huge stocks of the highest-grade iron ore in Europe, it produces some of the finest steel in the world and it normally enjoys a profitable export business in paper and wood products. Yet, for lack of coal which normally came from British and Continental sources in the course of two-way trade, Sweden's output of iron, steel and machinery is drastically curtailed. The Swedes are burning wood which they ordinarily would export. On top of this, Sweden's crop failure this year is one of the most serious in the nation's history.

"Sweden is in the middle of a dollar crisis that makes a drastic curtailment of imports from the United States imperative. It is in that crisis because the war destroyed the entire complex fabric of European economic interdependence..."

- - -

Professor Glenn T. Seaborg, Co-discoverer of Plutonium, Honored

NEW YORK, November 5 -

Professor Glenn T. Seaborg, nuclear expert and co-discoverer of plutonium, source of atomic power, has been honored with the 1948 William H. Nichols Medal of the New York Section, American Chemical Society. He was born in Ishpeming, Michigan, April 19, 1912. His mother came from Sweden at the age of seventeen, while his father was born in Ishpeming of Swedish parents. Professor at the University of California since 1945, Dr. Seaborg is also co-discoverer of americium, curium, and neptunium, all used in the creation of atomic energy. In 1946 he was appointed by President Truman to serve on the nine-man General Advisory Committee to the Atomic Energy Commission, and named "Chemist of the Year" in an informal poll conducted by Chemical and Engineering News. In 1947 he received the award in Pure Chemistry of the American Chemical Society, on which he serves as Councilor-at-large.

- - -

Re-creation of lost elements via A-bomb reversal seen

Los Angeles, Calif.
News
(Cir. 281,682)

By CAROL PHINNEY

NOV 10 1947

The atom bomb, heretofore the most-destructive force the world has ever known, may be reversed, in the opinion of one of its prime developers, Dr. Glenn Seaborg, to replace fast-disappearing world chemical resources.

Used-up elements, or elements in the world which are rapidly being used up without sign of replenishment, may be recaptured and re-created through a reverse process, thinks the 35-year-old discoverer of plutonium and other radioactive elements—the man who was chosen "Chemist of the Year" in 1946 and won most of the major prizes awarded by the American Chemical Society.

In short, this man, who has been identified from the start with the atom bomb, now says that the bomb can be turned upside down—that its principle, which heretofore has devastated humanity, can become a boon to humanity, and supply materials which the world has thought used up and gone forever.

The implications of this scheme are so enormous that Seaborg would not venture to guess where they might lead, but he did imply that the materialization of atoms would probably unlock ultimate secrets of nature and give man-

kind a new mastery over the physical world.

"Scientists have known for years it was theoretically possible to condense energy into matter, but they were unable to produce the tremendous energies necessary to make even the smallest atom," Seaborg explained.

"Now the University of California is building a super cyclotron, known as a bevatron, which should develop several billion electron volts of energy.

"Two billion electron volts, according to Einstein's theory, are equal to one deuteron, the essential part of a heavy water atom. Our machine is not 100 per cent efficient, so we will need more energy than that to make a deuteron."

Eventually, he indicated, more complex elements can probably be produced.

This doesn't necessarily mean that clothing, food and autos will come pouring out of atom-materializing factories. That would be doing it the hard way, because

there are plenty of atoms already in existence for these ordinary purposes.

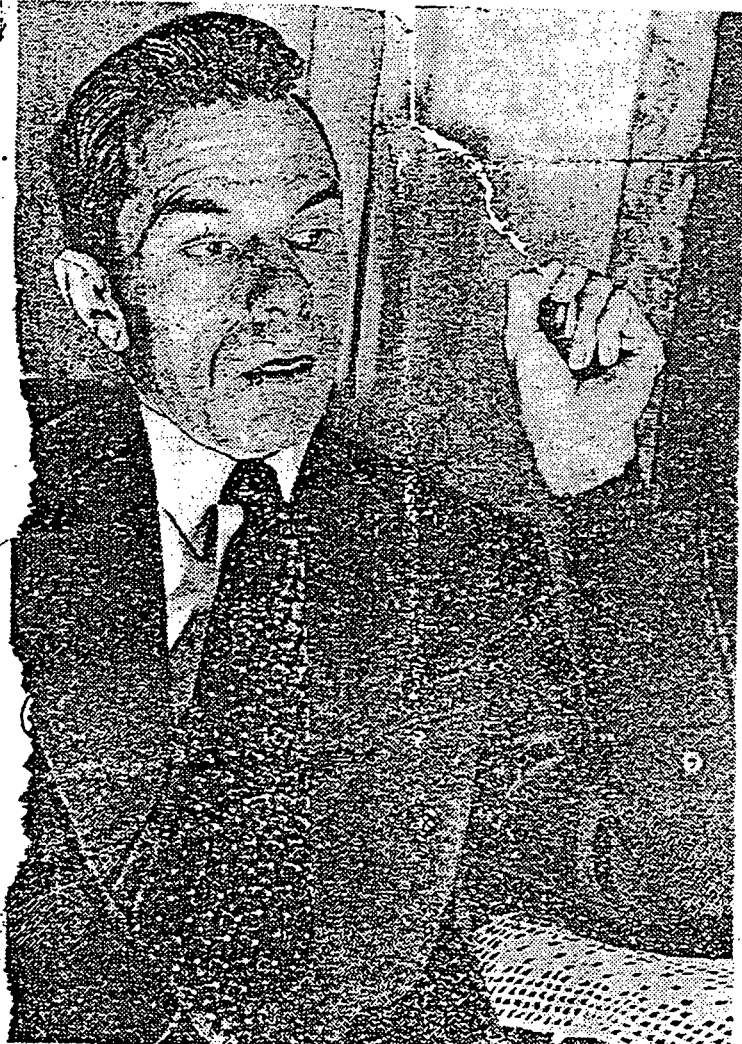
But the know-how gained in materializing even one atom may be of incalculable value to the world of the future.

For instance, Seaborg and his colleagues at Berkeley are already busy transmuting substances into other things in the 184-inch cyclotron built last year. They have bombarded arsenic with atomic particles and made it into almost every lighter element down to chlorine—15 elements away.

Once they know how atoms are built up instead of torn down almost anything may be possible.

The process that makes the sun give off energy radiation, by building up hydrogen into helium and breaking it down again, may be duplicated artificially on this planet to provide an almost inexhaustible source of power.

The gigantic whirligig in which he hopes to solve these secrets is 50 feet in diameter, and gets its name, bevatron, from the scientific abbreviation "b. e. v." for billion electron volts.



GLENN SEABORG MAY PUT ATOM BOMBS INTO REVERSE
Making matter from energy could revolutionize world

A-bomb reversal may replace lost elements

By CAROL PHINNEY

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Seaborg's associates, who worked with him during the war on the discovery of plutonium, include Dr. Isadore Perlman, Prof. Burriss B. Cunningham and Dr. David Templeton, all now at the University of California.

Until the bevatron is ready for use they will continue their transmutation experiments, which already, Seaborg said, have yielded several new important radioactive isotopes useful as "tracers" in biological and medical studies.

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Until the bevatron is ready for use they will continue their transmutation experiments, which already, Seaborg said, have yielded several new important radioactive isotopes useful as "tracers" in biological and medical studies.

URGES UNION OF NATIONS TO PREVENT ATOMIC WAR

WASHINGTON, Nov. 9.—(UP)—A former American foreign service officer today advocated a federal union of free peoples in the Western Hemisphere, Europe, Africa and Asia which would pool their resources to prevent an atomic war with the Soviet Union.

Livingston Hartley, author and foreign affairs analyst who served in the foreign service from 1928 to 1933, said "such a step into a new political order could provide strength through a continuing over-balance of power against Russia and her satellites."

"It could provide the United States not only with friends but with active partners," he said in an article entitled "Atomic Dilemma: Third Way Out," published in the magazine Air Affairs.

11/11/47

FAMED NUCLEAR SCIENTIST TO SPEAK AT ASSEMBLY

Dr. Glenn T. Seaborg, director of chemistry at the University of California radiation laboratories in Berkeley, will speak on *Peacetime Applications of Atomic Energy* at the November 11 morning assembly in Lisser Hall.

Known over the world as the co-discoverer of five elements—plutonium, americium, neptunium, curium and uranium, Dr. Seaborg is at present engaged in research work on the transuranium elements and on the identification of various nuclear reactions resulting from the operation of the Berkeley 184-inch cyclotron. He is also directing the work of a group of graduate students in nuclear chemistry and is giving an undergraduate lecture course in this field. His work in the metallurgical laboratory of the University of Chicago from 1942 to 1946, in connection with the manufacture of plutonium at the Manhattan Project and of its application to atomic energy, has been characterized as "outstanding in the field of chemistry."

Many merited awards and honors have come to the young scientist during the past years. Recently, he was given the 1947 award in pure chemistry by the American Chemical Society for which organization he is councilor-at-large. Last year, he was appointed by President Truman to serve on the nine-man general advisory committee to the Atomic Energy Commission. In an informal poll conducted by Chemical and Engineering News in 1946, the California scientist was named "chemist of the year." He also has been selected to give the 1947 Nieuwland Memorial lecture series at Notre Dame University during the week of November 17.

Since 1936, the renowned scientist has had sixty papers published on the general subject of nuclear chemistry and nuclear physics. Dr. Seaborg received his Ph.D. in chemistry from the University of California (Berkeley) in 1937.

ANNUAL VOCATIONAL INFORMATION DAY

Women in the Community will be the theme of the fifteenth annual Vocational Information Day programs on Wednesday, November 19. Its two fold purpose, as stated by Mrs. Ann Burpee, director of placement and personnel, is to point up women's obligations in a community, professionally as well as in a volunteer capacity, and to provide information on job opportunities for women. The key note address will be given by Mrs. Irene Heiniman of Los Angeles at the afternoon assembly in Lisser Hall. Mrs. Heiniman is assistant to the state superintendent of public instruction.

Faculty members will be chairmen of the twelve round tables at which guest speakers, outstanding in their professions, will discuss opportunities in such fields as costume design and interior decoration, journalism and writing, education, government and international understanding, health, the sciences, community services, volunteer work, marriage as a career, theatre and the arts, public and human relations, and consumer buying and its related topics.

Following the discussions refreshments will be served in the Student Union. Bulletin board displays depicting the vocational interests of the students are being arranged by the studio workshop group and will be shown in the Union.

LEAVES FROM THE COLLEGE CALENDAR

SERIES 18

Published by the Office of Public Relations

NUMBER 4

FLORENCE V. BIRKHEAD, Editor

Leaves from the College Calendar is published twice a month. It is sent *gratis* to officers of the College and parents of undergraduate students. Other friends of the College may be placed on the mailing list by sending the subscription of 25 cents a semester or 50 cents a year to the Office of Public Relations, Mills College, Calif.

Entered as second class matter September 26, 1930, at the Mills College Branch of the Post Office at Oakland, California, under the Act of August 24, 1912. Acceptance for mailing at the special rate of postage provided for by the Act of February 28, 1935, embodied in Paragraph 4, Section 538, P.L.&R., authorized Nov. 10, 1930.

00260

South Bend Tribune

DAY EVENING, NOVEMBER 19, 1947.

Says Half-Pound of Metal Could Power This City a Day

BY RAY GREGG.

Tribune Staff Writer.

An efficient atomic energy plant consuming only one-half pound of plutonium would furnish all the power needed for an entire day in a city the size of South Bend.

So said Dr. Glenn T. Seaborg, one of the nation's foremost experts on nuclear energy, here Tuesday. Dr. Seaborg, director of chemistry in the radiation laboratories at the University of California, Berkeley, came here to deliver three lectures at the University of Notre Dame in the 1947 Nieuwland memorial lecture series.

"I wouldn't care to put myself on record as to how soon this would come about," the gangling, youngish-looking scientist who is the codiscoverer of the element plutonium, told an interviewer. "However, the rate at which things are progressing these days it is foolish to guess at time schedules greater than 10 years."

Russia Needs Two Years.

Dr. Seaborg said that, reports from Russia notwithstanding, he would be "rather surprised if the Soviets had an atom bomb within two years." He added that there was no doubt but what the Russians would produce one eventually.

Plutonium has played a vital part in the atomic bomb and will play a leading role in the production of atomic energy. Dr. Seaborg also is the codiscoverer of americium and curium, elements Nos. 95 and 96 on the atomic scale.

"We might compare atomic energy with Faraday's discovery of electro-magnetic principles more than 100 years ago," explained Dr. Seaborg. "It took the greater part of 100 years before a use was made of his discovery in the invention of motors, generators and other electrical apparatus.



Dr. Glenn T. Seaborg, right, nuclear energy expert, tells Dr. Milton Burton, Notre Dame professor, of his discovery of americium, element No. 95 on this periodic chart of the atoms.

—Photo by Tribune Staff Photographer.

More to Work With.

"It won't take 100 years, though, for the development of atomic energy to a point where it can be used efficiently. We have so much more to go on now."

Dr. Seaborg pointed out that one drawback in the immediate application of atomic energy to

provide power that could be generated economically was the present lack of suitable materials for the construction of such a plant.

He explained that some material would have to be found that does not readily absorb the neutrons resulting from atomic chain reaction, and then means would have to be discovered to fabricate such a material.

Atom Development

A hint of the marvels that lie ahead of us in the atomic age was disclosed by Dr. Glen T. Seaborg in his address before the recent meeting of the American Chemical Society. At that meeting he told how his colleagues at the University of California, with the aid of the giant cyclotron there, had split bismuth, lead, thallium, platinum, tantalum and arsenic.

Thus is the short list of elements which so far can be split extended. But in this case there is no possibility of an extension of the means by which atom bombs can be produced, because it is impossible to set up a chain reaction of fission, with these elements.

The significance of the discovery described by Professor Seaborg lies in the fact that again proof is offered of the second phase of Einstein's theory; that not only can mass be converted into energy, as in the atom bomb, but that energy can be converted into mass as well. Thus has the old search of the alchemists of the Middle Ages become fact in true transmutation.

Professor Seaborg has himself recreated a few short-lived radioactive elements which "died" eons ago. But now he proposes that science go a step further, and synthesize elements which nature itself overlooked for the benefit of mankind.

If the present rate of development in atomic science continues, as presumably it will, this will turn into a strange new world indeed in which we live. And if we are to continue to live in it, it is no less vital that the political and social mind of man keep in step with the scientific mind, lest disaster fall upon us all. The decision cannot wait.

This Clipping From
MANCHESTER, N. H.
UNION

NOV 28 1947

17

ARMISTICE DAY ASSEMBLY HEARS NUCLEAR SCIENTIST DISCUSS PEACETIME USES OF ATOMIC ENERGY

Dr. Glenn T. Seaborg, world famous research scientist at the radiation laboratories of the University of California and co-discoverer of three nuclear elements, explained the present and future employment of atomic energy to an attentive assembly in Lisser Hall on November 11.



GLENN T. SEABORG

In opening his talk, the distinguished guest stated that the two vital peacetime aspects of atomic energy were its application to industrial power and its importance in medical and scientific research.

In explaining the first, Dr. Seaborg declared that the famous fissionable substances — plutonium and the isotopes of uranium—will be used as fuel in atomic energy machines especially designed for peacetime commercial uses.

Scientist Seaborg commented "an atomic energy industry will probably be developed in the future because of the advantages of this form of energy. However, the presence of radioactive rays makes it necessary to surround the reactors with large quantities of shielding material for protection from the rays. Therefore, atomic energy devices will be best suited, at least at first, to sta-

tionary structures. It will never be possible to use these devices for the propulsion of ordinary automobiles because of the weight of this shielding material, but they may eventually be used for the propulsion of boats or even large airplanes."

The second peacetime application of atomic energy, as voiced by Dr. Seaborg, is the use of by-product radioactive substances in research, with the greatest benefits probably to come through medical therapy and diagnosis, and in biochemical and medical research.

"For example," said Dr. Seaborg, "it is possible to determine the site of action of therapeutic agents, to decide which form of a new drug is absorbed most readily from the gastro-intestinal track, and to identify and thus be able to produce in the laboratory new chemical compounds. The incorporation of radioactive substances into the molecules of the sulfa drugs, penicillin and streptomycin, might lead to a better understanding of how they work." It will also be possible, disclosed the youthful California scientist, to use tracer isotopes to study cancer and once this mechanism is understood there will be a much better chance for working out preventive measures or cures.

Today, he added, there are about 500 radioactive substances known and research is going on in more than a hundred laboratories with radioactive substances being used in many branches of chemistry, physics, agriculture, plant physiology, metallurgy, zoology and branches of industrial research.

Dr. Seaborg's work during the war in connection with the manufacture of plutonium at the Manhattan Project has been characterized as "outstanding in the field of chemistry."

ISHPEMING, MICH
TRC. ORE
11/6/47

HIGH HONOR FOR PROFESSOR GLENN T.
SEABORG

Professor Glenn T. Seaborg of the University of California, co-discoverer of plutonium, man-made source of atomic energy, has been awarded the William H. Nichols Medal of the New York Section of the American Chemical society for 1948, it is announced by Professor Vincent du Vigneaud of the Cornell University Medical college, chairman of the jury of award.

The medal, one of the highest honors in chemical science, goes to Professor Seaborg for his research on plutonium, element 94, and his participation in the discovery of americium and curium, elements 95 and 96, and numerous artificial radioactive materials.

Professor Seaborg, who is 35, is a member of the nine-man advisory committee appointed by President Truman to assist the United States Atomic Energy commission. He received the \$1,000 American Chemical society prize in pure chemistry at the society's recent national meeting in New York for his contributions to nuclear science. In 1946 he was chosen "Chemist of the Year" in a nationwide poll of chemists and chemical engineers conducted by "Chemical and Engineering News," publication of the society.

The citation accompanying the Nichols award to Professor Seaborg reads as follows:

"Co-discoverer of numerous artificially produced radioactive isotopes and the elements plutonium, americium, and curium. Responsible for the determination of the fissionability of plutonium and other heavy isotopes and major contributors to chemical processes for the production of plutonium. Propounder of the idea of the actinide series for the transuranium elements."

Professor Seaborg has proposed that the elements starting with actinium, element 89, he called the actinide series because of a resemblance in chemical properties to the rare-earth elements in the lanthanide series starting with lanthanum, element 57.

A native of Ishpeming, Mich., Professor Seaborg received the Bachelor of Arts degree from the University of California at Los Angeles in 1934 and the Doctor of Philosophy degree from the University of California, Berkeley, in 1937. After two years as a research associate in chemistry, he became an instructor in 1939 and rose to the rank of full professor in six years.

During the war, on a leave of absence from California, he directed chemical research on plu-

tonium and other heavy elements for the atomic bomb project at the University of Chicago metallurgical laboratory. He received the 1945 Distinguished Service Award of the Chicago Junior Association of Commerce, and in 1946 was chosen Harrison Howe lecturer by the Rochester Section of the American Chemical society, and was elected a councilor-at-large of the society. He was appointed consultant in nucleonics at the General Electric company research laboratory in Schenectady, N. Y., this year.

The Nichols Medal award, conferred annually to stimulate original research in chemistry, was founded by the late Dr. William H. Nichols, a charter member of the American Chemical society and chairman of the board of the Allied Chemical and Dye corporation. Presentation of the medal to Professor Seaborg will be made on March 5, 1948, at a joint meeting of the society's New York Section and the American Section of the Society of Chemical Industry at the Hotel Pennsylvania in New York.

President, Scientists Observe Fifth Birthday of Atomic Age

Truman Cites Effort to Use Atomic Energy For Peace

CHICAGO, Dec. 2—(UP)—President Truman said today, on the fifth birthday of the atomic age, that the anniversary emphasizes the importance "of a vigorous effort to develop and utilize atomic energy for peaceful purposes."

President Truman's statement was read at a luncheon in honor of the scientists who developed and operated the first nuclear chain reactor at 3:25 p.m. on Dec. 2, 1942 in a converted squash racquet court beneath Stagg field on the University of Chicago campus.

"The fifth anniversary of the first successful operation of a nuclear chain reactor serves to focus our attention upon the speed of development of nuclear science," President Truman's message said.

He added that the U. S. Atomic Energy commission is "aggressively supporting" all efforts to use atomic energy for peaceful purposes.

At the same time, Chancellor Robert W. Hutchins of the University of Chicago told the 150 luncheon guests that there is no defense against the atomic bomb and that another war would wipe out civilization. He said there "is no secret" to the atomic bomb, and that "other nations will have the bomb some day."

Thus, Hutchins warned, "military preparations, however extensive and elaborate, can do us no good."

Other speakers included Sumner T. Pike, a member of the Atomic Energy commission, Dr. Enrico Fermi, Italian Nobel prize winner who designed the first chain reactor and Dr. Walter H. Zinn, director of the Argonne National laboratory for atomic energy.

After the luncheon the scientists unveiled a plaque at the spot where, just five years ago, Fermi and others set off the first sustained chain reaction in a huge pile of uranium and graphite blocks in the converted squash court.

President Truman's statement was read by Henry F. Tenney, chairman of the citizens board of the University of Chicago.

"The United States Atomic Energy commission is aggressively supporting a broad program of research and development of all phases of atomic energy," President Truman's statement said.

"The guiding policies of the commission's program are clearly set forth in the atomic energy act which states that at all times to the paramount objective of assuring the common defense and security, the development and utilization of atomic energy shall, so far as practicable, be directed toward improving the public welfare, increasing the standards of living, strengthening free competition in private enterprise, and promoting world peace."

Seaborg, Perlman Recall Events On Day of First Chain Reaction

News of the first chain reaction traveled fast through the atomic energy laboratory at the University of Chicago on that fateful day five years ago.

This is the story that two men who were there gave—Glenn T. Seaborg, professor of chemistry, and Isador Perlman, associate professor of chemistry.

Seaborg was research director in charge of plutonium chemistry at the University of Chicago laboratories at the time and is now doing similar work in the radiation laboratory on the hill.

Perlman and Burris B. Cunningham, assistant professor of chemistry, were his chief assistants there.

"We all knew about the chain reaction within 15 minutes after it happened," Seaborg said. He was not on the spot when the reaction occurred because he was working on another phase of the project at the time.

CAL
MTHLY
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AWARD OF THE WILLIAM H. NICHOLS medal of the New York section of the American Chemical society for 1948 has been made to Glenn T. Seaborg '34, professor of chemistry at the University. Seaborg received the award, one of the highest honors in chemical science, for his participation in the discovery of plutonium, americum and curium.

AMER. CHEM. IND. MAN. DEC. 47

Professor Glenn T. Seaborg, University of California, Berkeley, has been awarded the William H. Nichols Medal of the New York Section, American Chemical Society for 1948. The award will be made March 5, at a joint meeting of the New York section and American section, Society of Chemical Industry, Hotel Pennsylvania, New York.

VORTEX 12/47



VORTEX 1481
NICHOLS MEDAL FOR SEABORG

Professor Glenn T. Seaborg of the University of California, co-discoverer of plutonium, man-made source of atomic energy, has been awarded the William H. Nichols Medal of the New York Section of the American Chemical Society for 1948, it is announced by Professor Vincent du Vigneaud of the Cornell University Medical College, chairman of the jury of award.

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Professor Seaborg, who is thirty-five, is a member of the nine-man advisory committee appointed by President Truman to assist the United States Atomic Energy Commission. He received the \$1,000 American Chemical Society Prize in Pure Chemistry at the Society's recent national meeting in New York for his contributions to nuclear science. In 1946 he was chosen "Chemist of the Year" in a nation-wide poll of chemists and chemical engineers conducted by *Chemical and Engineering News*, publication of the Society.

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During the war, on a leave of absence from California, he directed chemical research on plutonium and other heavy elements for the atomic bomb project at the University of Chicago Metallurgical Laboratory. He received the 1945 Distinguished Service Award of the Chicago Junior Association of Commerce, and in 1946 was chosen Harrison Howe Lecturer by the Rochester Section of the American Chemical Society, and was elected a Councilor-at-large of the Society. He was appointed consultant in nucleonics at the General Electric Company research laboratory in Schenectady, N.Y., this year.

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SCIENTISTS PONDER ATOM AGE FINDINGS

Discussion at U.C.L.A. Meeting Emphasizes Mankind's Efforts to Live With New Force

Scientists at the concluding session of the American Physical Society conference at U.C.L.A. yesterday emphasized postwar mankind's strenuous efforts to live with the atom—safely.

They devoted 39 massive papers, jammed with technical data no layman could ever hope to understand, to subjects ranging from analysis of the "nuclear ruins" left by the giant University of California cyclotron to experiments into the effects of radioactivity on animal bone structures.

Understanding the nature of the tremendous force of nuclear fission was the theme of this earnest, solemn session.

Revelations Made

Dr. Glenn T. Seaborg, Berkeley chemistry professor who codiscovered plutonium and other "transuranium elements," revealed for the first time some of the secrets of uranium atom-smashing that employs 400,000,000 electron volts.

In a single massive bombardment with this tremendous force, uranium nuclei struck by ultra-high energy alpha particles were transmuted into "well over two-thirds of all the elements known to man," he said. This research was done under auspices of the Atomic Energy Commission.

Fission (the atom bomb's kind of nuclear splitting) and a "chipping" process created these elements out of the target uranium, he said.

Products of Fission

From fission came such products as iron (element 26) to the so-called "rare earths," ranging from elements 57 to 70. Uranium itself is No. 92 on the elemental scale. In this chipping or "spallation" process, Dr. Seaborg explained, as many as 30 pieces were knocked off the bombarded uranium nucleus. Smaller cyclotrons have been known to chip about half a dozen pieces from the atom, he said.

Dr. Seaborg also disclosed new data on the terrific speed with which bismuth atoms split under such a major cyclotronic pummeling.

Faster even than the fractionating of uranium, the bismuth atom splits in that flicker of a second represented by the numeral 10 followed by 18 zeros. Uranium splits in a "mere" 10,000,000,000,000ths of a second, he said.

Unsuited for Bombs

But the Berkeley chemist reported that bismuth fission isn't useful for atomic bombs, because the resultant neutrons (which cause chain reaction) don't develop enough power to split other bismuth atoms. They generate about 2,000,000 electron volts, whereas it takes 25 times that to shiver that particular elemental atom.

Meantime still other scientists are developing ingenious techniques for observing the biological action of "strange new elements of the atomic age," according to a paper delivered by Dr. Joseph G. Hamilton, associate professor of medical physics at the University of California, also an A.E.C. research project chief.

Photographs Shown

Never-before-shown photographs displayed by the Berkeley physicist demonstrated how plutonium (the "atomic bomb element") is distributed in bone tissue of laboratory animals injected with such radioactive material. This work began in 1942, when nuclear scientists were seeking ways to protect atomic workers from dangerous new radiations.

Research now is continuing on the newest of all elements, curium (No. 96) of which only a single grain has ever been made, Dr. Hamilton said.

He and his associates found that bone marrow, where red and white blood cells are manufactured, is extremely sensitive

Los Angeles Times † 3
SUNDAY, JAN. 4, 1948—Part I

to radiation. Its bombardment by alpha particles emitted by these absorbed elements could interfere with the multiplication of these vital cells.

Curious Phenomenon

Dr. Hamilton observed a "curious phenomenon," which he cannot yet explain, wherein these radioactive elements in bone marrow are accompanied by a "high uptake of radioactive substance in the liver."

Certain new fission products, such as cerium, also produced this peculiar phenomenon, he said.

Similarity of the distribution in tissue of some of these fission products and "transuranium elements" tend to confirm theories of his confrere, Dr. Seaborg, he added, leading toward the probability that there may be a whole new family of elements starting with actinium (No. 89 on the scale.)

INTERNATIONAL PRESS-CUTTING BUREAU

Extract from

THE TIMES

LONDON

Date: 6 JAN 1948

X TRANSMUTATION OF URANIUM

CALIFORNIAN PROFESSOR'S REPORT

FROM OUR OWN CORRESPONDENT

NEW YORK, JAN. 5

Dr. Glenn T. Seaborg, professor of chemistry at the University of California and co-discoverer of plutonium and other transuranium elements, told the American Physical Society at a meeting in Los Angeles that in one "bombardment" in a cyclotron there was brought about transmutation of uranium into no less than two-thirds of all the known elements.

He said it was the greatest transmutation ever accomplished. The "ammunition" used was two types of ultra-high energy alpha particles, nuclei of helium atoms, of 400m. electron-volts. Transmutation was brought about by two reactions: fission, as in the atomic bomb, and the "chipping" off of parts of atoms to change their essential nature.

In the chipping by the University of California's cyclotron at Berkeley, said Dr. Seaborg, as many as 30 nuclear pieces were removed from atoms as against a maximum of half-a-dozen in other cyclotron "bombardments." It was discovered then that the bismuth atom splits with far greater speed than the uranium atom. The time for the bismuth atom, said Dr. Seaborg, was a fraction of a second indicated by 10 with 18 zeros following, while the time for the uranium atom was 10 with 15 zeros.

S.F. CHRONICLE 1/3/38

U. C. Cyclotron Sets Mark for Atom Smashing

Special to The Chronicle

LOS ANGELES, Jan. 3—In a single terrific bombardment, the University of California's new 184-inch cyclotron has smashed uranium atoms into more than 65 different chemical elements.

In some cases, Dr. Glenn T. Seaborg told the American Physical Society here today, the uranium atoms were merely "chipped," with varying numbers of nuclear particles knocked off.

In others, the uranium atoms underwent the same kind of fission or splitting which occurs in an atomic bomb.

The "bullets" used to smash the uranium atoms were the hearts of helium atoms with energies up to 400 million electron-volts.

Dr. Seaborg also announced that uranium fission is quite rapid. A uranium atom splits in a million-billionth of a second. On the other hand, fission of a bismuth atom is even faster, occurring in a billion-billionth of a second.

ELEMENTS SWITCH IN 'NUCLEAR DEBRIS'

Scientists at Los Angeles Get
Details of U. of California
Cyclotron Tests

Special to THE NEW YORK TIMES.

LOS ANGELES, Jan. 3 — Remarkable findings on the results of atom-smashing by the University of California's cyclotron at Berkeley were reported today. The papers were read at the final session of a two-day meeting of the American Physical Society.

Dr. Glenn T. Seaborg, Professor of Chemistry at the university, and co-discoverer of plutonium and other trans-uranium elements, gave details of a study of the "nuclear debris" resulting from an atom-

smashing bombardment with the cyclotron.

In bombardments with other cyclotrons, he related that scientists had succeeded in transmuting uranium atoms into other elements. In one such bombardment, there was brought about the transmutation of uranium into no less than two-thirds of all the known elements.

Dr. Seaborg described this as the "greatest transmutation" ever accomplished. "Ammunition" used in the bombardment was two types of ultra-high energy alpha particles, the nuclei of helium atoms, of 400,000,000 electron volts.

This transmutation—classic goal of alchemists and scientists for centuries—was brought about, Dr. Seaborg said, by two reactions: fission, as in the atomic bomb; and "chipping" off parts of atoms to change their essential nature. The one reaction occurs in some atoms, the other being peculiar to others.

In the "chipping" at Berkeley,

Dr. Seaborg said, as many as thirty nuclear pieces were removed from atoms, compared with a maximum of a half dozen in other cyclotron bombardments.

The study also yielded the new information that the bismuth atom splits with far greater speed than the uranium atom. The time for bismuth, Dr. Seaborg said, is that fraction of a second indicated by 10 with eighteen zeros following, while the time for uranium is 10 with fifteen such zeros.

Dr. Joseph G. Hamilton, associate Professor of Medical Physics at the university, told of a technique developed for studying the effect of radioactive chemicals in animal tissue.

After radioactive products of fission are introduced in minute quantities into the bodies of test animals, cross-sections of bone one-200,000th of an inch thick are cut out. These are placed on a photographic plate, and the radioactivity causes tiny imprints. Then an ordinary microphotograph of the

cross-section is made. By comparing the two photographs, the exact location of the radioactive element can be determined. This, in turn, shows the precise radioactive penetration.

This research is a step in ascertaining the over-all effect of radioactive material on living tissue, on the basis of which protective procedures may be developed.

THE DICKINSON PRESS, DICKINSON, N. D.

10 Men Named as Outstanding in U. S. by Jaycees

Chattanooga, Tenn. — (AP) — Names of 10 young men, chosen as "outstanding" in the United States in 1947, were announced Tuesday by the U. S. Junior Chamber of Commerce.

Selected by a panel of nine American business, industrial and professional men, the 10 include two mayors, two congressmen, two representatives of the atomic energy field, a blind radio engineer, a surgeon-anesthetist, a human relations expert, and an advocate of world government.

10 Men Chosen

The 10 young men chosen were:

Cord Meyer, jr., 27, president of the United World Federalists, New York city.

Dr. Robert A. Hingson, 34, among the first to use the new invention, hypospay, and a developer of caudal anesthesia to eliminate childbirth pain, Memphis, Tenn.

DeLesseps S. Morrison, 35, mayor of New Orleans, La.

Lavon P. Peterson, 28, blind founder of an engineering school for the blind, Omaha, Neb.

Dr. Glenn Theodore Seaborg, 35, nuclear chemist whose work aided in the discovery of plutonium, americium and curium, Berkeley, Calif.

Stassen to Speak

Glenn Robert Davis, 33, congressman, Waukesha, Wis.

Thomas R. Reid, 33, human relations expert, Baltimore, Md.

James Quigg Newton, jr., 35, mayor of Denver, Colo.

Richard M. Nixon, 34, congressman, Whittier, Calif.

Adrian Sanford Fisher, 33, atomic energy commission counselor, Washington, D. C.

The young men will be introduced at a banquet here tonight. Harold E. Stassen, outstanding young man of the year in 1939 and a presidential aspirant, will speak.

Chattanooga Daily Times

CHATTANOOGA, TENN., WEDNESDAY, JANUARY 21, 1948. *

10 OUTSTANDING YOUNG MEN HERE FOR BANQUET TONIGHT; STASSEN TO ADDRESS GROUP



'MEN OF YEAR'—Ten winners of the United States Junior Chamber of Commerce national title of "Young Man of the Year" for 1947 are shown. They will be honored at a banquet at the Read House tonight. The honorees are, left to right, top row, Adrian Sanford Fisher, James Quigg Newton Jr., Cord Meyer Jr., Dr. Robert A. Hingson and Glenn Theodore Seaborg; bottom row, LaVon P. Peterson, Thomas R. Reid, Glenn Robert Davis, deLesseps S. Morrison and Richard M. Nixon.

VOX POP TO AIR IT

Ruby-Studded Keys Will Be
Awarded Each by U. S.
Junior C of C

GOP CANDIDATE FLIES IN

Presentation to Be Made by
John Ben Shepperd, Head
of National Jaycees

The nation's 10 outstanding young men of 1947 will receive ruby-studded keys from the United States Junior Chamber of Commerce at a banquet tonight at the Read House starting at 8:30 o'clock.

Harold Stassen, 40-year-old candidate for the Republican nomination for President, will be the main speaker.

The 10 honored men, chosen by a committee of nine prominent persons, include two mayors, two congressmen, two men from the atomic energy field, a blind radio engineer, a surgeon-anesthetist, an advocate of world government, and a human relations expert.

Stassen Arrives at 4:30

They and Stassen, who is expected to arrive by plane at 4:30 this afternoon, will be guests at a reception in the sun room of the Read House at 5:30 o'clock.

The 10 men will appear on the Vox Pop program (WDEF-ABC which will originate from the Chattanooga High School auditorium starting at 7:30 o'clock. All those who have tickets to the broadcast must be in their seat by 7 o'clock.

Presentation of the keys by John Ben Shepperd, president of the national Jaycee organization, will be broadcast from the Read House banquet room over WDEF-ABC starting at 10:30 o'clock. In addition to his address to those attending the banquet, Stassen will participate in the broadcast of the award presentations climaxing the banquet program.

BERKELEY DAILY GAZETTE

22 PAGES

BERKELEY, CALIFORNIA, WEDNESDAY EVENING, JANUARY 21, 1948



Prof. Glenn T. Seaborg of the University of California, co-discoverer of plutonium, man-made source of atomic energy, was today chosen by the United States Junior Chamber of Commerce as one of the 10 outstanding young men of the nation.

Young UC Scientist Wins National Honor

Dr. Glenn T. Seaborg, University of California professor of chemistry and one of the nation's leading nuclear scientists, has today been selected as one of the 10 outstanding young men of the nation for 1947 by the United States Junior Chamber of Commerce.

Prof. Seaborg, 35, was one of the leading figures in atomic bomb research. He is one of the discoverers of three synthetic transuranium elements: plutonium, element 94; americium, element 95; and curium, element 96.

The University scientist also isolated and identified uranium 233, and demonstrated that it undergoes fission with slow neutrons.

His research brought about a very complete knowledge of the many radioactive isotopes of all the heavy elements.

Recently Dr. Seaborg has been leading chemical research connected with the giant University cyclotron here. The young scientist and his colleagues are studying the massive transmutation of atomic nuclei caused by bombardments with the giant machine.

Dr. Seaborg was nominated for the high national honor by the San Francisco Junior Chamber of Commerce.

HIGHEST HONOR

Only recently he also was awarded the William H. Nichols Medal of the New York Section of the American Chemical Society for 1948.

The medal, one of the highest honors in chemical science, went to Prof. Seaborg for his research and a co-discoverer of plutonium, man-made source of atomic energy.

In 1946 he was chosen "Chemist of the Year" in a nation-wide poll of chemists and chemical engineers. He is a member of the nine-man

Top 10 Young Men Selected

CHATTANOOGA, Tenn., Jan. 21 (AP)—The United States Junior Chamber of Commerce tonight will award ruby-studded keys to the nation's 10 outstanding young men of 1947, following an address by Republican presidential contender Harold E. Stassen.

The keys will be presented by John Ben Shepperd of Gladwater, Texas, national Jaycee president, who last night announced the names of the 10 honored men.

The men, selected by a committee of nine prominent business men, are: deLesseps S. Morrison, 35, New Orleans, La., mayor; James Quigg Newton, Jr., 35, Denver, Colo., mayor; Glenn Robert Davis, 33, congressman, Waukesha, Wis.; Richard M. Nixon, 34, congressman, Whittier, Calif.; Adrian Sanford Fisher, 33, Atomic Energy Commission counselor, Washington, D. C.; Dr. Glenn Theodore Seaborg, 35, nuclear chemist, Berkeley, Calif.; LaVon P. Peterson, 28, blind founder of an engineering school for the blind, Omaha, Neb.; Dr. Robert A. Hingson, 34, anesthetist and surgeon, Memphis, Tenn.; Thomas R. Reid, 33, human relations expert, Baltimore, Md.; Cord Meyer, Jr., 27, president of United World Federalists, New York City.

The banquet, as well as the other activities on today's program, will be informal.

Precedent Broken

It will be the first time since the national Jaycees started making the annual awards that the dinner honoring recipients has been held outside Chicago.

The selection of Chattanooga was made possible by the aggressiveness of the Chattanooga Junior Chamber of Commerce, aided by public officials, the newspapers and the radio stations here.

The 10 outstanding young men are:

Cord Meyer Jr., 27, New York City, president of the United World Federalists, Inc., a graduate of Yale and a member of Phi Beta Kappa. He has written and lectured on the necessity for a world federation with sufficient power to keep peace. His most recent book is "Peace or Anarchy."

Dr. Robert A. Hingson, 34, Memphis, surgeon in the United States Public Health Service and professor of anesthesia, College of Medicine, University of Tennessee. He is the first physician to use hypnospray. With Dr. Waldo B. Edwards he developed a successful technique of continuous caudal analgesia through which 90.4 per cent of 2,500 mothers received complete relief from the pains of childbirth.

New Orleans Mayor

DeLesseps S. Morrison, 35, mayor of New Orleans. Defeated entrenched political machine, helped abolish mayor's veto power, put over \$64,000,000 bond issue for public improvements.

LaVon P. Peterson, 28, Omaha, Neb. Blind since birth, founder of Radio Engineering Institute for blind in Omaha, only school of its kind in the world. Institute trains blind persons to repair radios and electronic equipment. Many, after graduating, set up own repair shops.

Glen Theodore Seaborg, 35, Berkeley, Calif., chemist in field of nuclear reactions at University of California. Isolated element 94, plutonium, isolated and identified U233 and demonstrated that it undergoes fission with slow neutrons. More recently his work led to discovery of elements 95 and 96 in various isotopic forms and resulted in a thorough knowledge of the many radioactive isotopes of all the heavy elements.

Glenn R. Davis, 33, Waukesha, Wis. Congressman from Wisconsin, active in veterans legislation and investigation of regional offices of Veterans Administration. Supported United Nations, bipartisan foreign policy, urged passage of Stratton Bill to aid European displaced persons.

James Quigg Newton Jr., 25, mayor of Denver. Defeated strong political machine. Hired Dr. Solomon Kauver to overhaul the health department, an FBI man to bring

This Clipping From

SAN FRANCISCO, CALIF.
CHRONICLE

JAN 21 1948

U. C. Professor Is Honored For Nuclear Physics Work

Dr. Glenn Theodore Seaborg yesterday was named one of the Nation's 10 "outstanding" young men.

At 35, Dr. Seaborg is one of the brightest stars in the new scientific age which ushered in the atomic bomb and promised peaceful uses of atomic energy.

A full professor at the University of California, Dr. Seaborg has spent his entire career there, except for the war years when he was on leave to the Metallurgical Laboratory of the University of Chicago—a key unit in development of the atomic bomb.

Dr. Seaborg was born at Ishpeming, Mich., April 19, 1912. He received his A. B. in chemistry from the University of California at Los Angeles in 1934. Three years later he was made a doctor of philosophy in chemistry at the University of California, Berkeley.

PLUTONIUM DISCOVERY

From 1937 to 1939 he was a research associate at Berkeley, an instructor from 1939 to 1941, an assistant professor from 1941 to 1945. He was made a professor in 1945.

His main field of investigation has been in nuclear chemistry and nuclear physics. In 1940 he was codiscoverer of plutonium—used in the Nagasaki atomic bomb.

At the University of Chicago, he worked on chemical separation of plutonium. Procedures he developed were used at Clinton, Tenn., and Hanford, Wash., in the manufacture of materials for the bomb.

He also is codiscoverer of a fissionable isotope of Uranium 233 through which it may be possible to use thorium indirectly for atomic energy. He is codiscoverer of the long-lived isotope of neptunium and of the elements Americium and Curium.

RESEARCH AT U. C.

At present he is engaged in research at the University of California on the transuranium elements and on identification of nuclear reactions induced by use of the 184-inch cyclotron.

In 1946 he was appointed to the nine-man general advisory committee to the Atomic Energy Commission.

In 1946 Dr. Seaborg was named "chemist of the year" in an informal poll conducted by Chemical and Engineering News.

Last year he was awarded the Pure Chemistry Award of the American Chemical Society.

He also delivered the second annual Harrison Howe Memorial Lecture before the Rochester, N. Y., section of the A. C. S.

the police department up to proper standards, employed city personnel expert at salary greater than his own as mayor. Contributed to municipal aviation law.

On Un-American Committee

Richard M. Nixon, 34, Whittier, Calif., Congressman from California, member of Herter committee which toured Europe, devoted much time to thorough investigation of needs in foreign aid, played leading role in House Labor Committee work, served on Un-American Activities Committee.

Adrian Sanford Fisher, 33, Washington, D. C. General counsel of Atomic Energy Commission, served as adviser on group which produced Marshall plan. Graduate of Harvard Law School and Phi Beta Kappa.

Thomas R. Reid, 33, Baltimore, Md. Vice-president in charge of human relations, McCormick & Co. of Baltimore. Has written and lectured on McCormick multiple management plan, represented employers as one of six members of United States delegation to International Labor Conference in Montreal in 1946 and in Geneva in 1947. Elected to Baltimore city council in 1947, now chairman of budget and finance committee and is applying industrial personnel system to city employment program.

The judges who chose the outstanding young men were Paul G. Hoffman, president of Studebaker Corporation; Milton Eisenhower, president of Kansas State College of Agriculture and Applied Science; William Green, president of American Federation of Labor; Sylvester Dayson, president of Premier Oil Refining Company; Justin Miller, president of National Association of Broadcasters; Frank M. Wilkes, Southwestern Gas and Electric Company; Eric Johnston, president of Motion Picture Association, and S. Bruce Black, president of Liberty Mutual Life Insurance Company.

CHATTANOOGA-NEWS-FREE PRESS 11/21/48

Work With Atoms in Medicine To Bring Man Biggest Benefit

Use of radioactive materials, such as isotopes, in the fields of medicine and biology, will bring a far greater contribution to humanity than the use of fissionable substances as fuels to replace coal, Dr. Glenn T. Seaborg, tall young scientist of the University of California, told The News-Free Press today.

Dr. Seaborg, 35, a full professor of chemistry at University of California, and one of the 10 outstanding young men of the year who will attend the Chattanooga Jaycee dinner tonight at the Read House, believes isotopes, such as are now produced at Oak Ridge and employed at Vanderbilt University, are much more important in "curing the ills of humanity" than fissionable materials that go into atom bombs or are now being studied with a view to constructing furnaces for the production of energy.

"It will take at least a decade to build an atomic energy plant large enough to heat a city the size of Chattanooga," the scientist declared.

GREATER VALUE

"The average individual stands to profit far more from the use of radioactive materials in medicine and biology than by the employment of these substances in

constructing heating plants, because it is more important to cure disease than to bring about the constructing heating plants, because it is more important to cure disease than to bring about the production of electricity at a cheaper rate," he continued.

Dr. Seaborg said isotopes were now being used as "tracers" to detect disease in the human body. Not only were the isotopes proving successful in diagnosing maladies, but they are enabling researchers to study the action of "antibiotic" drugs such as penicillin, streptomycin and the sulfa derivatives.

Radioactive materials are also being used to destroy, by radiation, diseased tissues. This therapeutic use is now widespread, for example in the control of thyroid gland trouble, Dr. Seaborg said.

The young scientist explained as one instance of the use of radioactive isotopes, the testing of the human circulatory system by feeding a radioactive salt to a patient.

"A Geiger counter can be used to test whether the salt is being circulated all over the body, and thus can be used to detect diseased tissues and can guide surgeons in making definite diagnosis before operating," he explained.

ISOLATED 94

During the war, Dr. Seaborg was director of a laboratory group studying chemical processes for plutonium production. He is credited with having isolated Element 94, plutonium, and having isolated and identified U-233, which he demonstrated undergoes fission upon bombardment with slow neutrons.

His recent work led to the discovery of Element 95 and 96 (americium and curium) in various isotopic forms, and resulted in more complete knowledge of the many radioactive isotopes of all the heavy elements.

Dr. Seaborg, who now teaches advanced students in chemistry at the University of California, said he saw the recent Rose Bowl game in which Michigan defeated University of Southern California.

Outcome of that game was "all right," he said, with a smile.

"I was born in Michigan," he said, "and USC is not my school."



HONOR OUTSTANDING MEN OF YEAR

One of nation's 10 outstanding men of the year honored at banquet in Chattanooga, Tenn., Dr. Glenn T. Seaborg, (right), 35, nuclear chemist of Berkeley, Calif., received plaque from John B. Shepperd (left), national president of the U. S. Junior Chamber of Commerce. Harold Stassen, contender for the Republican presidential nomination, was guest speaker.

Associated Press Wirephoto

CHATTANOOGA 1, TENNESSEE, WEDNESDAY, JANUARY 21, 1948.



FOUR OF THE 10 YOUNG MEN of the United States who arrived Tuesday in preparation for tonight's Distinguished Service Award Dinner at the Read House are shown with Shelby Brammer, local Junior Chamber president, and Clifford D. Cooper, national Jaycee vice-president from California. Left to right are Cooper, LaVon Peterson of Omaha, founder of the only radio engineering school for the blind; Dr. Robert Hingson of Memphis, pioneer in methods to eliminate childbirth pains; Dr. Glenn T. Seaborg of Berkeley, Calif., nuclear chemist who isolated plutonium, americium and curium; Brammer and Adrian Fisher of Washington, general counsel for the Atomic Energy Commission. They and six others will be honored at the U. S. Jaycee dinner, at which Harold Stassen will be principal speaker.—(Staff Photo by Bob Sherrill.)

10 Outstanding Young Men of U.S. Named; Stassen to Speak Tonight

Federation of World Said Peace Solution

By EARL D. HALE

"The facts of atomic energy, biologic warfare and rocket development lay this country open to a surprise attack whereby the 200 major cities of the U. S. and their 40,000,000 inhabitants could be suddenly eliminated by an enemy dropping 200 atom bombs."

That is the alarming prospect facing the U. S. unless immediate steps are taken to eliminate war and the preparation for war by the nations of the world, according to Cord Meyer Jr., 27-year-old president of United World Federalists, Inc., one of the 10 outstanding young men of the year to be feted by U. S. Jaycees tonight.

"We haven't much time to prevent such a catastrophe," Meyer declared today, in an interview with The News-Free Press, "and the issue is the survival of this nation."

Meyer fought in the Pacific as a marine corps captain. He took a prominent part in the successful fight to eliminate reportedly com-

munist influence in the American Veterans Committee. His most recent book, "Peace or Anarchy," was published last October.

Only the establishment of "a rule of law, with effective powers of enforcement on a world level" will prevent possibility of a devastating sneak attack upon the U. S., the ex-marine declared today.

MUST TAKE LEAD

"The U. S. must make a definite and specific offer to strengthen the UN, giving that body legislative, judicial and executive powers,

1/23/48

Next to the News

By ALFRED MYNDERS

EVENTS, as well as people, can be surcharged with genius. Such an event was the seven-state entertainment of the Outdoor Writers of America held here last year.

Again Chattanooga rang the bell with the banquet of the United States Chamber of Commerce, honoring the 10 outstanding young Americans Wednesday evening at the Read House. "New York could not have done it as well," said a leading citizen to the writer as the crowd filed out. When an event is tinged with genius, it must be so much better than people expected that everyone feels with satisfaction: "Here is something extraordinary going on."

THERE was ringing applause every minute or two—and something to applaud about. The wit and personality and savoir faire of Shelby Brammer, president of the Chattanooga Junior Chamber of Commerce, and of John Ben Shepperd of Texas, president of the United States Junior Chamber of Commerce, delighted the capacity audience to start with, and put everybody at ease. The amazing achievements of the 10 young men were presented in a manner to arouse the audience to great enthusiasm.

That a blind man from birth should be able to start a radio school, where the blind are taught to be experts in repairing radios and electronic apparatus is something to marvel at, and the audience stood and cheered that blind genius. He was deeply touched and, like all the others, was warm in praise of Chattanooga hospitality.

MAYOR MORRISON of New Orleans was prevented from coming by the hot Louisiana election, but James Quigg Newton Jr., the young giant killer who slew the 35-year-old Denver political machine, was there—a man of winning personality and crusading views on efficient government.

No outstanding outstanding young man was chosen. That is to say, not one man of the year was singled out. But when Dr. Glenn Seaborg of Berkeley, Calif., stepped up to receive his engraved plaque of honor, Harold Stassen arose from his seat and came up and put his arm on Dr. Seaborg's shoulder. This was not singling out one man above all others, but was the recognition of outstanding genius. This young man's work led to the discovery of plutonium and other elements vital

in nuclear fission. He was elected outstanding young man of the year at Chicago two years ago, moved to San Francisco and was elected outstanding young man there. In fact, he is just naturally an outstanding young man.

——*

HAROLD STASSEN was obviously delighted with the flow of wit and enthusiasm and the Chattanooga spirit.

John Ben Shepperd, president of the U. S. Jaycees, had paid a glowing tribute in introducing Mr. Stassen, and the audience arose to applaud him for several minutes.

"I never expected such an introduction from a Texas Democrat, or such a reception from Chattanooga, Tenn.," said Mr. Stassen.

At the conclusion of the eloquent speech by Mr. Stassen, John Ben Shepperd said: "If you make many more speeches like that you will be eating ham sandwiches on that new balcony eventually."

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AT THE start, Shelby Brammer turned the program over to the ingratiating and witty Mr. Shepperd, then remembered that he had forgotten something. He whispered in Mr. Shepperd's ear, and Mr. Shepperd said: "We will have to start all over again. Shelby Brammer forgot the mayor's address of welcome."

Mr. Brammer took over again; "I am not apologizing for anything," he said, "I think we have done pretty well." The crowd roared and applauded, Mayor Wasson made a graceful little talk, Jared Maddux, state comptroller, representing Gov. McCord, said a few words; the state president of the Junior Chamber spoke briefly, Mr. Shepperd resumed his speech. Again Shelby Brammer had landed on his feet.

At 10:30 there was a nation-wide broadcast, when Mr. Shepperd presented the ruby-studded gold keys to the 10 outstanding young men, and Mr. Stassen spoke a second time. The timing on this program was perfect, the applause "correct," the events moving and touching in their simple genius.

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CHATTANOOGA was in the nation's eye, and Chattanooga rang the bell. The Jaycees who have followed these annual events for years say that never has it been done so well and so inspiringly before. It was just about a perfect evening.

The Chattanooga Junior Chamber of Commerce can show the oldsters a thing or two about staging great events and extending Chattanooga hospitality. But certainly Chattanooga has reason to be proud of two Chamber of Commerce meetings held here within a month—the address of Secretary of Commerce Averell Harriman to the senior chamber, and this nationwide event of Wednesday night. Those 10 outstanding young men will not forget Chattanooga.

Barbara Jo Walker of Memphis, "Miss America" for 1947, flew over with her mother to grace the occasion. She was in the Vox Pop broadcast at the City High School, sat at the head table with the 10 young men at the banquet, spoke briefly on the 10:30 radio program and showed that she has a voice as lovely as her face and her figure. All the young men were proud of her—and the old ones, too.

10 Outstanding Young Men of U.S. Selected

National Jaycees Stage Annual Dinner Here To Honor Leaders

(Continued From Page 1)

zine. Editor Raymond (Tex) Roberts is in the city for the DSA dinner.

HONORARY CITIZENS

The 10 young men, along with Stassen and Shepperd, will be honorees at a reception to be held in Read House sun room at 5:30 p.m. At 7:30, they will be interviewed by Parks Johnson and Warren Hull on the Vox Pop program, which originates from City High auditorium (WDEF-ABC). They will receive their keys on the 25-minute ABC broadcast at the dinner beginning at 10:35. Shelby Brammer, local president, will present them certificates of honorary citizenship and local Jaycee membership.

Distinguished panel of judges consisted of Paul G. Hoffman, president of Studebaker Corporation; Milton Eisenhower, president of Kansas State College of Agriculture and Applied Science; Morris B. Pendleton, president of Plomb Tool Company; William Green, president of the AFL; Sylvester Dayson, president of Premier Oil Refining Company; Justin Miller, president of National Association of Broadcasters; Frank M. Wilkes, Southwestern Gas and Electric Company; Eric Johnston, president of Motion Picture Association; S. Bruce Black, president Liberty Mutual Insurance Company.

MARINE VETERAN

A marine combat veteran, Meyer has written and lectured extensively on necessity for a world federation with sufficient power to keep the peace. He took a leading role in the successful fight to eliminate reportedly communistic influence in the American Veterans Committee.

Dr. Hingson is a surgeon with the U. S. Public Health Service and professor of anesthesia, College of Medicine, University of Tennessee. With Dr. Waldo B. Edwards, he developed successful technique of continuous caudal analgesia through which 90.4 per cent of 2,500 mothers received complete relief from childbirth pains.

Defeating an entrenched political machine, Mayor Morrison restored civil service to city, fought political corruption, put over a \$64,000,000 bond issue recently for port improvements, civic center, union station, relocation of most of 144 dangerous grade crossings, street improvements.



NIXON



MEYER



FISHER



DAVIS



REID



NEWTON



MORRISON



SEABORG



PETERSON



HINGSON

TRAINS BLIND

Peterson's school trains blind persons to repair radios and electronic equipment, and graduates, after a year's training, have in many instances set up their own repair shops. He trained men for armed services in totally darkened rooms under simulated war conditions in 1942 and 1943.

More recently, Seborg's work led to discovery of elements 95 and 96, americum and curium in various isotopic forms and resulted in a very complete knowledge of many radioactive isotopes of all the heavy elements. He formerly isolated plutonium and demonstrated it under fission with slow neutrons.

Rep. Davis is active in veterans' legislation and investigation of regional VA offices. Rep. Nixon was a member of the Herter committee which toured Europe and played a leading role on labor committee work in the House, as well as serving on the un-American Activities Committee.

REID ILL

Reid, who is ill and is being represented tonight by Ed Ellis, North Carolina state Jaycee president, represented employers on the U.S. delegation to the International Labor Conference in Montreal in 1946 and in Geneva in 1947. He was elected to the city council, Baltimore, last year and is chairman of the budget and finance committee.

Mayor Newton also defeated an entrenched political machine, hired experts to overhaul the Denver health and police departments and hired a city personnel expert at a salary greater than his own. He previously directed a multi-million-dollar building program at the University of Denver, which he headed as president of the board of trustees.

Fisher, besides being general counsel of the AEC, served as adviser on the group which actually produced the Marshall plan.

LISTS 10 YOUNG MEN OUTSTANDING IN '47

N. Y. TIMES 1/21/48

Cord Meyer Jr. of New York
Among Those Chosen by U.S.
Junior Commerce Group

Thursday Morning, Jan. 22, 1948

NASHVILLE TENNESSEE

Piddling Around

CHATTANOOGA—(AP)—Reuben Holland, Chattanooga high school sophomore in conversation with Dr. Glenn T. Seaborg, whose efforts aided in the discovery of plutonium, americium and curium, asked:

"When you were doing that work, did you know you were going to make that discovery?"

"Well, no," replied the nuclear scientist from the University of California.

"Oh, you mean you were just piddling around?"

Seaborg laughed.

"I guess that's about the best definition of science yet," he replied, "just piddling around."

DAILY C.M. 1/21/47

Seaborg Named Outstanding Young Man of Nation for 1947

Glenn T. Seaborg, professor of chemistry, has been named one of the 10 outstanding young men of the nation for 1947 by the United States Junior Chamber of Commerce, it was announced yesterday.

This honor was given upon recommendation of the San Francisco Junior Chamber of Commerce to the 35-year-old scientist, who last year was chosen outstanding chemist of the year by the American Chemical society.

One of the leading figures in atomic bomb research, Seaborg participated in the discovery of three synthetic

trans-uranium elements: plutonium, element 94; americium, element 95, and americium, element 96.

The University scientist's research brought about a very complete knowledge of radioactive isotopes of heavy elements. He isolated and identified Uranium 233 and demonstrated that it undergoes fission with slow neutrons.

Recently Seaborg has been leading chemical research connected with the University's cyclotron. With his colleagues he is studying the massive transmutations of atomic nuclei caused by bombardment with the machine.

CHATTANOOGA, Tenn., Jan. 20 (AP)—The names of ten young men chosen as "outstanding" in the United States in 1947 were announced today by the United States Junior Chamber of Commerce.

Selected by a panel of nine American business, industrial and professional men, the ten include two Mayors, two Congressmen, two representatives of the atomic energy field, a blind radio engineer, a surgeon-anesthetist, a human relations expert, and an advocate of world government.

The ten young men chosen were: Cord Meyer Jr., 27 years old, of New York, president of United World Federalists.

Dr. Robert A. Hingson, 34, of Memphis, Tenn., among the first to use the new invention, hypospray, and a developer of caudal anesthesia to eliminate childbirth pain.

deLesseps S. Morrison, 35, Mayor of New Orleans, La.

Lavon P. Peterson, 28, of Omaha, Neb., blind founder of an engineering school for the blind.

Dr. Glenn Theodore Seaborg, 35, of Berkeley, Calif., nuclear chemist whose work aided in the discovery of plutonium, americium and curium.

Glenn Robert Davis, 33, of Waukesha, Wis., Congressman.

Thomas R. Reid, 33, of Baltimore, Md., human relations expert.

James Quigg Newton Jr., 35, mayor of Denver, Colo.

Richard M. Nixon, 34, of Whittier, Calif., Congressman.

Adrian Sanford Fisher, 33, of Washington, D. C., counselor of the Atomic Energy Commission.

The young men will be introduced at a banquet here tomorrow night Harold E. Stassen, outstanding young man of the year in 1939 and a Presidential aspirant, will speak.

Judges for the 1947 selections were Paul G. Hoffman, president of Studebaker Corp.; Milton Eisenhower, president of Kansas State College of Agriculture and Applied Science; Morris B. Pendleton, president of Plomb Tool Company; William Green, president of the American Federation of Labor, and president of Premier Oil Refining Company.

Also, Justin Miller, president of the National Association of Broadcasters; Frank M. Wilkes, president of Southwestern Gas and Electric Company; Eric Johnston, president of the Motion Picture Association of America; and S. Bruce Black, president of Liberty Mutual Insurance Company



YOUNG MEN OF THE YEAR LOOK AT 'THE NEW LOOK'—Miss Barbara Walker of Memphis, Miss America 1947, found an attentive audience in the eight of the 10 outstanding young men of the nation who were honored here last night at the U. S. Junior Chamber of Commerce Distinguished Service Awards dinner. Admiring Miss America's "new look" gown are, up the steps in pairs, Dr. Adrian Fisher, Cord Meyer Jr., James Quigg Newton Jr., LaVon Peterson, Dr. Glenn T. Seaborg, Dr. Robert A. Hingson, Richard M. Nixon and Glenn R. Davis.—(Staff Photo by Bob Sherrill.)

Dear Glenn. Congratulations!
I am interested know how
you like your new job.
Are you the new coach?
Thosfin

Nation's Ten Outstanding

On January 21, the United States Junior Chamber of Commerce, world's largest young men's civic action organization, presented the Nation's Ten Outstanding Young Men of 1947 at a Distinguished Service Award banquet in Chattanooga, Tenn.

John Ben Shepperd, U.S. JCC president, presented the men with ruby-studded DSA keys over a nationwide ABC radio hookup following the banquet in the ballroom of the Read House. Chattanooga Jaycees staged the banquet.

Harold E. Stassen, formerly a recipient of the same honor, was the principal speaker of the occasion which brought together 400 civic, business and Jaycee leaders from big and small towns alike, and from scattered sections of the nation. Stassen, former governor of Minne-



James Quigg Newton, Jr.



Richard M. Nixon



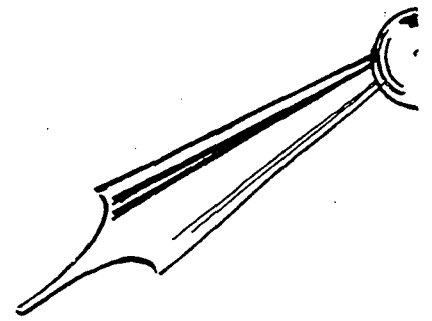
LaVon P. Peterson

sota and US representative at the San Francisco UN charter conference, is a charter member of the East St. Paul, Minnesota, Jaycees.

Cord Meyer, Jr., 27-year-old president of the United World Federalists, made the response for the Ten Young Men after John Ben had presented the keys.

Before the banquet they were presented to the nation on Vox Pop by Warren Hull and Parks Johnson before 5,000 Chattanoogaans that jammed a local auditorium to hear how the top ten live and work. A reception opened the evening's festivities.

Among the Ten are two men from the Atomic energy field, two mayors, two Congressmen, a blind radio engineer, a surgeon-anesthetist, a human relations expert and an advocate of world government.



Adrian Sanford Fisher



deLesseps S. Morrison



Men of

Young Men of 1947



Cord Meyer, Jr.



Thomas R. Reid

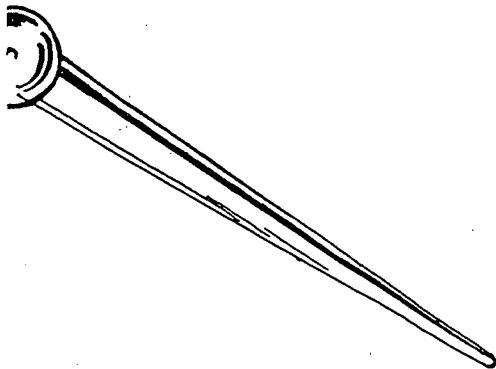
Selection of the Nation's Ten Outstanding Young Men of the Year, according to available records, is a program that dates back to 1934 when it is believed Durward Howes of Los Angeles, former editor of the volume, "America's Young Men," named the first such group.

In 1936, the U.S. JCC presented a Distinguished Service Key award to the Young Man of the Year (FUTURE, Jan. '48) and, after the founding of FUTURE in September of 1938 by an energetic group of Jaycee leaders, the present program evolved.

In conducting the program for the U.S. JCC, under the portfolio of Clifford D. Cooper, National Vice President from Alhambra, Calif., FUTURE strived to encourage nom-



Glenn Theodore Seaborg



Glenn R. Davis

Dr. Robert A. Hingson



inations of men from every section of American life for the judges to consider.

This panel of distinguished leaders, over 35 years of age, took many hours from busy days to make their choices from among scores of photostatic copies of nomination blanks and documents. (See list of judges on next page.)

Their ballots were cast impartially for the men of their choice, regardless of affiliation, who had affected national thinking or methods in a particular field and who had made outstanding contribution to the general welfare as well as to a business or profession.

It is hoped that these ten young leaders, all under 35, will inspire all young men to strive for greater heights of accomplishment.

the Hour

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N.Y. Times, Feb. 1, 1948

DR. SEABORG WINS MEDAL

Nuclear Chemist to Receive 1948
John Ericsson Award

Feb. 1
Dr. Glenn T. Seaborg, of the University of Southern California, has been selected to receive the 1948 John Ericsson Gold Medal of the American Society of Swedish Engineers in recognition of his outstanding research in nuclear chemistry, according to an announcement yesterday by Arvid Lundquist, president of the society.

The award will be made at the society's sixtieth anniversary dinner to be held Feb. 11 at the organization's clubhouse, 27 West Fifty-first Street.

The medal, first given in 1926, is awarded every second year either to a Swedish subject or an American citizen of Swedish descent for extraordinary merit in technical or scientific fields.

ST. LOUIS, WEDNESDAY, FEBRUARY 4, 1948

—MEN OF SCIENCE IN ST. LOUIS—

Two Young Chemists Who Were Among Plutonium Discoverers

Joseph Kennedy, 31, and Arthur Wahl, 30, of Washington University, Classified as Outstanding in Their Field.

By
EVARTS A. GRAHAM JR.
Of the Post-Dispatch Staff.
(Second of a Series.)

PLUTONIUM, according to Webster, was anciently regarded as a menace to the infernal regions. It is also an element which is essential to atomic bombs. It was identified definitely and its chemical properties were first explored in 1940 by a group of young men who then were all less than 35 years old.

Two of those men who explored the infernal regions are now at Washington University. Joseph William Kennedy, now 31 years old, is professor of chemistry. Arthur C. Wahl, 30, is an associate professor of chemistry. With four other young atomic scientists, they were rounded up in 1946 from the Manhattan Project's Los Alamos (N.M.) laboratory by Dean of Faculties J. C. Stearns to bolster the university's chemistry department. Kennedy, who was leader of the chemistry and metallurgy division at Los Alamos, is a tall Texan with a frank, easy, relaxed manner and a musical voice. A native of Nacogdoches, a town near Shreveport, La., as Texas distances go, he is a product of the South, not of the western cattle country.

Los Alamos and its wartime director, J. Robert Oppenheimer, have left him with the habit, a trademark among Los Alamos scientists, of invariably using "this" in sentences in which other people would use "that" or "it." He is so accustomed to this that he is surprised when it is pointed out to him. Then he explains, "This is because of our high regard for Oppie."

In the study of atomic fission, the line separating physics from chemistry is virtually non-existent. Kennedy, like his students in his course on radiochemistry, is not always sure whether he is a physicist or a chemist.

Majoring in Chemistry.

The confusion began when he first started graduate work. He majored in chemistry during his undergraduate days at Stephen F. Austin State Teachers College, a school in Nacogdoches with about 600 students, because there wasn't any physics department.

When he received his A.B. degree in 1933, he had compiled a straight-A record, except for B's in courses in rural sociology and modern drama.

He entered the University of Kansas as a graduate student in chemistry. There he worked on the chemistry of acetic acid, although, as he explained to a somewhat annoyed chemistry professor, he was more interested in nuclear physics.

He received a master's degree from Kansas in 1937 and, moving up through what he described as "the University of California's farm system," he went to Berkeley. At California he worked on the chemistry of Element 43, an element which does not occur in nature, and separated by chemical means isomeric compounds of the element tellurium, a considerable accomplishment at the time. Nuclear isomers were nuclei which have the same constituents but exist in different energy levels.

The announcement of atomic fission was published in 1939, the year he received his Ph.D. degree. Kennedy immediately began research in the field. A year later, when he was 24 years old, he



—By a Post-Dispatch Staff Photographer.
ARTHUR C. WAHL



JOSEPH W. KENNEDY

joined forces with Wahl, then a 23-year-old graduate student working for his Ph.D.

Wahl is a slim, earnest, sober man whose glasses cover deep circles under his eyes. A native of Des Moines, Ia., he was graduated from Iowa State College at Ames before going to California in 1939. Like Kennedy, he has not been teaching long enough to have acquired a professorial air, and he discusses his work in a conversational manner. He, too, uses the Los Alamos "this."

In 1940, Wahl and Kennedy began working with Glenn T. Seaborg and Emilio Segre on the properties of Element 93, a radioactive relative of uranium which had just been discovered by Edwin M. McMillan. They soon identified an isotope of Element 94, plutonium 238. The new elements, whose existence had been suspected for several years, were named neptunium and plutonium respectively because their relation to uranium, element 92, in the atomic table is the same as the relation in the solar system of the planets Neptune and Pluto to Uranus.

Detective Story Logic.

"The method of finding these things," Kennedy said in a neat exercise of detective story logic, "is like solving a murder. You go into all the alibis and prove what it can't be. Then, after your suspicions are aroused and you get some more information, you know what it is."

Kennedy and Wahl give much of the credit for the discovery of plutonium to McMillan. After McMillan found neptunium, he knew how to get plutonium and had started the process when he suddenly was summoned to Massachusetts Institute of Technology to work on radar. McMillan got on a train, Kennedy said, and the others found plutonium.

Plutonium was made by bombarding uranium with various particles, in a cyclotron. The total amount they had to work with was far too small to see, because of the expense of operating the cyclotron for long periods, but it was enough to begin an analysis of its chemical properties.

While Wahl separated the plutonium chemically from the other products of the bombardment of uranium, Kennedy made measurements of its properties. "Wahl couldn't do both," Kennedy explained. "His hands were so contaminated by radiation that the instruments would have been recording the activity of his hands."

At the end of 1940, the California scientists embarked on a definite project to prepare plutonium 239, the form in which the element was used in the atomic bombs.

"This was because it was recognized as an element likely to be fissionable," Kennedy said. "It

was discussed in hushed tones behind closed doors, but none of us had any real thought of using it in war at this time. Our motivation was mostly to obtain information—we knew the Germans were working on fission, and we wanted to find out how hard or easy this was. We weren't thinking about an atomic bomb, not because of moral questions but because nobody thought it would be practical in a short time."

Produced Plutonium.

The California group produced some plutonium 239, just enough to detect, and showed that it was, in the language of nuclear fission, a decayed daughter of neptunium 239, an isotope which McMillan already had identified. An amount of plutonium large enough to see was not produced until the Washington University cyclotron later was put to work on the job with the cyclotron at California.

Working with the microscopic amounts of the element, Wahl, Seaborg and Kennedy found out enough about its chemical properties to make possible, after further research, its production and separation on a large scale.

The methods used and the information gathered never have been made public, because of their importance in the construction of an atomic bomb. Kennedy has an additional explanation. "The papers on the subject are so uninteresting," he says, "that nobody ever has gone to the trouble of taking them out of the safe and declassifying them."

Kennedy and Wahl are not very impressed with their own accomplishments, however. They simply applied well-known chemical principles and processes, they say. "We were just lucky," Wahl remarked. "We happened to be in the right place at the right time."

YOUNG SCIENTISTS HELPED LEAD WAR TO PLUTONIUM

Continued From Page One.

In early 1943, Kennedy and Wahl moved from Berkeley to Los Alamos, where the atom bomb was put together. Wahl worked on final purification of the materials. Kennedy and Metallurgist Cyril S. Smith were jointly in charge of the chemistry and metallurgy division and, the Smyth report says, "were responsible for final purification of the enriched fissionable materials, for fabrication of the bomb core, tamper, etc., and for various other matters."

Kennedy says most of his work there came under the heading of other matters, which, as he tells the story, turn out to be administrative. "If I hadn't sneaked back to the laboratory at night to work on a hobby," he said, "I wouldn't have done any research at all." The nature of the hobby is also a secret.

Recruiting Personnel.

One of Kennedy's principal tasks was recruiting personnel. "I was first taken out there," he related, "when Los Alamos was nothing more than a school for boys. By default I became head of the division. I was a jack-of-all-trades. Once when we needed a machinist, I found one who was willing to go to Los Alamos only if he could take his minor children with him. The man had been divorced, and I had to appeal to a divorce court to get permission for the man to take the children without his wife's knowledge."

When it became apparent that a trained metallurgist was needed, Kennedy, who knew virtually nothing about the subject, set out to find one. He had heard of a good metallurgist at Massachusetts Institute of Technology, and left for Cambridge to talk to him.

En route he stopped at Chicago and discovered that the man had been grabbed by Manhattan Project scientists there. Kennedy went to New York, where a metallurgists' convention was meeting.

"I stood in the doorway looking at name tags as the metallurgists went by," he said. "This is literally true. After three days, we had a metallurgist, and a first-class one. Smith was bored stiff with a desk job in Washington. We convinced him to go to Los Alamos by guaranteeing that he would not have an administrative job. Of course he shortly became joint leader of the division, and never got away from his desk."

For his work during the war, Kennedy received the United States Army Medal of Merit, the highest award given civilians. "This is the way they give these things out," he said. "Somebody in Washington decides how many are to be given to lawyers, how many to physicists and how many to chemists. They had one left over they had to give to somebody."

Ablest in Field.

He and Wahl were among five St. Louis chemists who were selected recently by the Chicago section of the American Chemical Society as "the ablest in their fields." Kennedy is a member of a committee which is in charge of allocating radioactive isotopes

and Ferguson school districts have arranged for annual examinations, and 22 other public, Catholic and Lutheran schools in St. Louis county have their pupils examined by the dental division of the County Health Department every three years.

WOMAN FINED \$15 ON CHARGE OF SPEEDING ON LINDELL BLVD.

Miss Anna Morris, 5375 St. Louis avenue, was fined \$15 today by Police Judge Joseph B. Catanzaro when she was found guilty of a charge of speeding 45 miles an hour on Lindell boulevard between De Baliviere avenue and Union boulevard.

She was arrested last Wednesday by Patrolman Dennis Aubuchon, who testified she passed six other automobiles while he was overtaking her machine.

Miss Morris denied driving faster than 35 miles an hour and told the court she was "a careful driver and haven't had an accident in the 22 years I've been driving." Records in the office of the clerk of the police court showed she was fined \$5 on a speeding charge last August.

CHICAGO MILK PRICE INQUIRY

CHICAGO, Feb. 4 (INS).—The City Council yesterday authorized an investigation into retail milk prices, currently 22 cents a quart for home delivery.

HIGH LOW RAIN

(Observations at 7:30 a.m. for previous 24 hours.)

Hammer, N. Dak.	58	36	...
Heaton	25	6	...
Chicago	23	6	...
Chicoutimi	33	30	...
Columbia, Mo.	32	20	...
Denver	31	13	...
Detroit	17	13	...
Fl. Worth	43	13	...
Kansas City	25	18	...
Los Angeles	55	40	...
Memphis	43	39	...
Miami	68	63	...
Minneapolis	7
New Orleans	61	50	...
New York	25	15	...
Oklahoma City	41	31	...
Phoenix, Ariz.	63	44	...
Philadelphia	28	18	...
St. Louis, City	38	29	...
St. Louis, Airport	34	32	...
Washington, D. C.	42	30	...

from Oak Ridge, Tenn., for research purposes.

Both are married, and each has a small child. They live in the new apartment building which the university constructed on the campus. Since coming here they have been directing research in the speed of chemical reactions, using radioactive isotopes as tracers, in an effort to determine the reason why some reactions occur rapidly and others take place only slowly, if at all. Kennedy also has been directing work in the measurement of half-lives of radioactive isotopes. "This," he said, "is very dull work—dealing with the region between microseconds and milli-seconds."

Wahl's chief diversion, when he has an opportunity, is fishing. Kennedy is an avid tennis player and was a member of high school and college tennis teams. That may have been the reason why he was appointed by Chancellor Arthur H. Compton to serve on a faculty committee which selected Blair Gullion as athletic director. Kennedy has a different explanation, however. "When they appoint one of these committees," he said, "they want one fellow who surprises everybody. In this way, they think, they add breadth."

NEW YORK HERALD TRIBUNE
Circ. D. 358,813, Sat. 297,694, S. 708,75

MAR 4 - 1948

**Chemical Society to Give
Medal to Professor Seaborg**

Professor Glenn T. Seaborg, of the University of California, co-discoverer of plutonium, man-made source of atomic energy, will be awarded the William H. Nichols Medal of the American Chemical Society's New York Section at a dinner at 7 tomorrow night at the Hotel Pennsylvania. The medal will be given for Professor Seaborg's work on plutonium and his participation in the discovery of the elements americium and curium. Following the presentation to be made by Professor Vincent du Vigneaud, of Cornell University Medical College, Professor Seaborg will speak on "The Neptunian Radioactive Family."

NEW YORK JOURNAL-AMERICAN
Circ. D. 648,851 S. 1,113,109

MAR 4 - 1948

Medal for Seaborg

Professor Glenn T. Seaborg of the University of California, co-discoverer of plutonium, will receive the William H. Nichols Medal of the American Chemical Society's New York Section at a dinner tomorrow in the Hotel Pennsylvania.

NEW AID CREATED FOR ATOMIC POWER

Seaborg, Receiving Nichols Medal, Announces Family of 14 Radioactive Isotopes

By WILLIAM L. LAURENCE

Creation of an entirely new family of fourteen radioactive isotopes, at least one of which will provide an abundant new element for use in atomic bombs and for atomic power, was announced last night by Prof. Glenn T. Seaborg of the University of California, co-discoverer of the man-made fissionable element, plutonium (element 94), and of elements 95 and 96, americium and curium.

Professor Seaborg described the synthesis of the new radioactive family at a dinner at the Pennsylvania Hotel at which he received the William H. Nichols Medal of the New York Section of the American Chemical Society, one of the high honors in chemistry. He was cited "for pre-eminent contributions in the fields of artificially produced radioactive isotopes, new radioactive elements and the determination of their fissionability, chemical processes for the production of plutonium, and relationships among the trans-uranium elements."

The new fissionable element is uranium of atomic weight 233. It was created in milligram amounts in the atomic furnace by subjecting the non-fissionable element, thorium, to intense bombardment with neutrons. Like its relative, uranium 235, U-233 can be used for nuclear explosions in bombs and for the release of nuclear energy for power.

At present only the natural substance, U-235, and the man-made element, plutonium, created by the transmutation of uranium 238, can be utilized for the release of nuclear energy by a self-sustaining chain reaction. Thorium, an element three times more abundant in the earth's crust than uranium, will thus theoretically triple the availability of nuclear fuels or explosives.

The new family of fourteen radioactive isotopes, none of which has ever been found in nature, has been named the neptunium family, because the key number is neptunium 237, an isotope of the man-made element 93. It is the last of the four possible families of heavy radioactive isotopes to be studied.

New Series Called Neptunium

The isotopes of the new series are characterized by their atomic weight, which, when divided by four, leaves a remainder of one. For this reason the new family is

also called the neptunium (4n plus 1) series, since 237 divided by four leaves a remainder of one. The atomic weights of the three natural series, thorium (4n), uranium (4n plus 2) and actinium (4n plus 3), leave remainders of zero, two, and three, respectively, when divided by four. Uranium 235 (4n plus 3) is not a member of the uranium family, but of actinium.

All the isotopes in the new family have been synthesized and their radioactive properties analyzed, Professor Seaborg reported. He also revealed that uranium 233 is also being produced in small amounts in the huge atomic piles at Hanford, Wash., out of uranium 238. This process, however, does not seem promising for the production of large amounts.

"During the production of plutonium 239 [the atomic bomb element] in the uranium-graphite chain-reacting pile," he revealed, "there is also produced as a by-product the isotope of neptunium of atomic weight 237, at a rate amounting to the order of a tenth of 1 per cent of the rate at which plutonium 239 itself is produced. It has already been possible, as the result of special chemical separation procedures at the Hanford plutonium production plant, to isolate several hundred milligrams of this material."

MAR 6 - 1948

Scientist discloses new type A-bomb

By Howard W. Blakeslee

(Associated Press Science, Editor)

New York.—Dr. Glenn T. Seaborg, famous atomic scientist, disclosed Friday night that the first small pieces of a new kind of atomic bomb and fuel metal have been manufactured.

The new metal is uranium 233, made by changing the heavy metal thorium into uranium. This new form of uranium does not exist naturally on earth. Neither is it known to exist in the stars.

A small part of an ounce of the thorium metal, Dr. Seaborg reported, has been made in the Hanford, Wash., uranium-graphite, chain-reacting, atomic piles. The total new metal is a few hundred milligrams.

Use practicable

This statement was not amplified. But it means that the atomic ovens, which change uranium into plutonium, also

can bake more than one kind of atomic metal.

These ovens were built to change uranium. Whether they can be used, without alterations, to change thorium too, Dr. Seaborg did not say. But the fact that the same oven has produced both kinds of transmuted, man-made metals shows that thorium's use for atomic power is practicable.

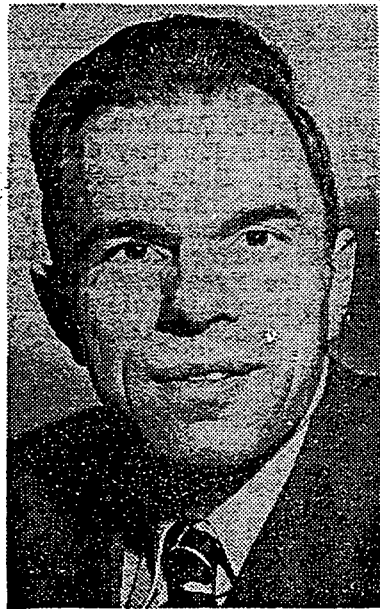
Since thorium is three times more plentiful than uranium, it will be the world's main reliance for atomic power. Uranium is so scarce that the known supplies would not keep the present-size American power industry running more than five years.

When uranium is converted into Plutonium this power supply is multiplied, probably by 100 times.

Lasts many years

Dr. Seaborg also disclosed that the new form of uranium 233, when manufactured by transmutation, will last for many thousands of years. Its "life" is far longer than that of plutonium. The thorium transmutation produces a new atomic metal that will half disintegrate in 162,000 years. Plutonium does the same half disintegration in about 24,000 years.

Dr. Seaborg made the disclosures in a paper prepared for his response to award of the William H. Nichols medal of the New York section of the American Chemical Society.



DR. GLENN T. SEABORG

MAR 6 1948

Feb. 200

New Source of Energy Seen

New York — (U.P.) — A potential source of atomic energy was opened to science today with the disclosure of a new series of man-made radioactive isotopes.

This latest development in nuclear research was reported last night by Prof. Glenn T. Seaborg of the University of California. At a dinner here Seaborg was awarded the William H. Nichols medal of the American Chemical society's New York section.

The new group of isotopes includes 14 principal types, none of which ever has been found in nature, Seaborg said. The series has been named the neptunium family, because the key number is neptunium-237.

Form of Uranium

Seaborg said one of the new isotopes is uranium-233, a fissionable form of uranium which differs only in atomic weight from uranium-235, which was used in making one of the early atomic bombs. He said that since uranium-233 is formed by bombarding thorium with neutrons in an atomic pile, large supplies of thorium in nature may be used as an indirect source of atomic energy.

Seaborg, one of the nation's leading nuclear scientists, was cited for "pre-eminent contributions in the fields of artificially produced radioactive isotopes, new radioactive elements and the determination of their fissionability."

MAR 4 - 1948

New Atom Energy Source Hinted

A hearthside picture of a new atomic family of radioactive isotopes, including a potential source of energy, was given in New York today by a University of California scientist.

The introduction was made by Dr. Glenn T. Seaborg, brilliant young professor of chemistry on the Berkeley campus and much-honored nuclear scientist, on the occasion of receiving the William H. Nichols medal of the American Chemical Society.

TO CHEMICAL AWARD

Professor Seaborg, 35, co-discoverer of plutonium, curium and americium, and named one of the 10 "outstanding" young men in America last January by the United States Junior Chamber of Commerce, was awarded the medal—one of the highest honors in chemical science—at a dinner of the society's New York section.

He described for the meeting the neptunium family of isotopes, last of four possible families of heavy radioactive isotopes to be studied, consisting of 14 members, none of them found in nature.

Prominent in the group is uranium 233, an isotope relative of uranium 235, used in making one of the early atomic bombs.

NUCLEAR FUEL

"An interesting feature of this family," Dr. Seaborg said, "is the presence of neutrons and is therefore a possible nuclear fuel.

"Since uranium 233 is formed as a result of absorption of neutrons by thorium, it is possible to use non-fissionable thorium as a nuclear fuel source indirectly through fissionable uranium 233."

ISOTOPES NOT NEW

Three of the four transuranium elements—neptunium, plutonium and americium—are true members of the family, Dr. Seaborg said, while the fourth—curium—is also represented by an isotope. Other elements in the family, not found in nature, include astatine and francium.

All of the isotopes in the family have been produced synthetically and their properties analyzed, he said.

The isotopes themselves are not new, as their production and identification in the university's giant cyclotron and its smaller predecessor have been continuing since early in 1942.

Seaborg to Receive Nichols Medal

Professor Glenn T. Seaborg of the University of California, co-discoverer of plutonium, will receive the William H. Nichols Medal of the American Chemical Society's New York section at a dinner in the Hotel Pennsylvania, March 5, it was announced yesterday.

The medal, one of the highest honors in chemical science, goes to Professor Seaborg for his work on plutonium, element 94, and his participation in the discovery of americium and curium, elements 95 and 96, and numerous artificial radioactive materials.

Professor Vincent du Vigneaud, head of the department of biochemistry in the Cornell University Medical College and chairman of the jury of award, will present the medal to Professor Seaborg, who will speak on "The Neptunium (4N by 1) Radioactive Family."

Other speakers will be Dr. Ralph S Halford of Columbia University and Dr. Winston M. Manning of the Argonne National Laboratory, Chicago. Professor Hans T. Clark of the College of Physicians and Surgeons, Columbia University, chairman of the New York section, will preside.

San Francisco, Cal., Call-Bulletin
Circ. D. 169,987

MAR 4 1948

DAILY CAL. 3/7/49

Sproul, Alexander to speak at alumni Charter Day banquet

Sir Harold R. L. G. Alexander, governor general of Canada, and President Robert Gordon Sproul will speak at the annual Charter Day banquet of the Alumni association March 23.

The award of a leather-encased scroll to the "Alumnus of the Year" will highlight the evening. Among the alums who received this honor in the past are President Sproul, Monroe E. Deutsch, vice president emeritus, Gov. Earl Warren and

James H. Doolittle, wartime air hero.

More than 1,000 guests are expected for this "giant University reunion" and it is anticipated that classes as far back as 1885 will be represented. William M. Hale, president of the Alumni association, will act as toastmaster for the evening.

The Glee club will provide entertainment for the event, which marks the 81st anniversary of the granting of the University's charter by the state legislature.

Hanford Project Confirms Report Of New A-Metal

RICHLAND, Wash., March 6 (AP)—An official spokesman for the Hanford atomic project today confirmed an Eastern scientist's report a new kind of atomic metal has been produced in the plants near here.

The new atomic metal is uranium 233.

The disclosure a minute quantity of it had been produced from thorium was made first last night by Dr. Glenn T. Seaborg, University of California atomic scientist, in New York city. Thorium is described as a much more abundant metal than the uranium that has been used for conversion into plutonium at the Hanford project.

The Public Relations Office spokesman said "small traces" of the new uranium 233 had been produced, enough for research work only.

He said he could not disclose where the research work with it is being conducted. S.F. CHRONICLE

S.F. CHRONICLE 3/6/49

Better Atom Metal Now Being Made

NEW YORK, March 5 (AP)—Dr. Glenn T. Seaborg, famous atomic scientist, disclosed tonight that the first small pieces of a new kind of atomic bomb and fuel metal have been manufactured.

The new metal is Uranium 233, made by changing the heavy metal thorium into uranium. This new form of uranium does not exist naturally on earth. Neither is it known to exist in the stars.

Since thorium is three times more plentiful than uranium, it will be the world's main reliance for atomic power. Uranium is so scarce that the known supplies would not keep the present size American power industry running more than five years.

A small part of an ounce of the thorium metal, Dr. Seaborg reported, has been made in the Hanford, Wash., uranium-graphite, chain-reacting, atomic piles. The total new metal is a few hundred milligrams.

This statement was not amplified. But it means that the atomic ovens, which change uranium into plutonium, also can bake more than one kind of atomic metal.

These ovens were built to change uranium. Whether they can be used without alterations, to change thorium too, Dr. Seaborg did not say. But the fact the same oven has produced both kinds of transmuted, man-made metals shows that thorium's use for atomic power is practicable.

MAR 7 - 1948

SCIENCE MARCHES ON

Thorium to Speed Up Output of Atom Bombs

DR. ROY K. MARSHALL, Science Editor of The Bulletin

From time to time, in the last two and a half years, there have been hints that thorium, an element roughly three times as plentiful as uranium, can be used for atomic bombs and other atomic energy applications. Now something more than a suggestion has come from Dr. Glenn T. Seaborg, of the University of California.

Dr. Seaborg, a major contributor to the discovery of the new man-made elements plutonium, americium and curium, was awarded the William H. Nichols Medal of the New York Section of the American Chemical Society, on March 5. He has been one of the leaders in the most advanced ranks of the atomic energy project since the beginning, and his grasp of the nuclear chemistry involved in these fields of the heavy radioactive elements is not exceeded by that of any other scientist today.

In the atomic pile, graphite and pure uranium are stacked up. The uranium consists of two natural forms of that metal, the isotopes called U-235 and U-238. The numbers attached to the letter U, the symbol for the element itself, are the relative weights in terms of the hydrogen atom, whose weight is unity. The atomic particles called neutrons, either in the air

or produced artificially, strike the atoms of U-235 and cause them to split and yield heat and other forms of energy.

They also yield more neutrons, some of which strike other atoms of U-235, after being slowed down by the graphite. But some of them strike atoms of U-238, which promptly become atoms of the new element neptunium. These, in turn, very soon change spontaneously into atoms of the new element plutonium. It is plutonium which is used in the newest models of the atomic bomb.

Now, Dr. Seaborg discloses, the common element thorium can be changed into another form of uranium, called U-233, and it, too, is fissionable. That means that U-233 will split and give out energy and neutrons.

The way to get U-233 from thorium is to put the pure thorium into an atomic pile where pure uranium

is already working to produce heat and plutonium. The thorium will be bombarded by some of the neutrons and will become U-233. The thorium itself will not yield energy, but the U-233 will act as U-235 does, to split, yield energy and more neutrons.

While the purification of large quantities of U-233, to use as atomic bomb fuel, is probably impracticable, just as the purification of large quantities of U-235 was given up in favor of the manufacture of plutonium, the use of thorium in a pile can speed up the action there and, especially in the proposed atomic energy power plants, can supplement uranium in a very important way.

Thorium occurs in the proportion of about 12 parts per million of the earth's crust. Important sources are found in Scandinavia, India, Brazil and the United States. Very soon after the announcement of the atomic bomb, India imposed restrictions on the export of thorium, at the advice of some of the British-educated Indian scientists who were quite familiar with the general theories and techniques behind the atomic energy problem.

The use of thorium which has been most prominent in a practical way for a generation or more is in connection with gas mantles. The woven fabric of the mantle was impregnated with a compound of thorium. The gas flame then became very white and steady. Now thorium is destined to take part in the most advanced developments in the atomic energy field.

MAR 7 - 1948

New A-Power Element Triples Nuclear Aid

Uranium 233 Created by Bombarding Plentiful Thorium With Neutrons

Special to the New York Times and The Atlanta Journal

NEW YORK, March 6.—Creation of an entirely new family of 14 radioactive isotopes, at least one of which will provide an abundant new element for use in atomic bombs and for atomic power, was announced by Prof. Glenn T. Seaborg, of the University of California, co-discoverer of the man-made fissionable element, plutonium (element 94), and of elements 95 and 96, americium and curium.



GLENN SEABORG

Professor Seaborg described the synthesis of the new radioactive family at a dinner here at which he received the William H. Nichols medal of the New York section of the American Chemical Society, one of the high honors in chemistry.

The new fissionable element is uranium of atomic weight 233. It was created in milligram amounts in the atomic furnace by subjecting the non-fissionable element, thorium, to intense bombardment with neutrons. Like its relative, uranium 235, U. 233 can be used for nuclear explosions, bombs and for the release of nuclear energy for power.

At present only the natural substance U 235 and the man-made

element plutonium, created by the transmutation of uranium 238, can be utilized for the release of nuclear energy, by a self-sustaining chain reaction. Thorium, an element three times more abundant in the earth's crust than uranium, will thus theoretically triple the availability of nuclear fuels or explosives.

The new family of radioactive isotopes, none of which has ever been found in nature, has been named the neptunium family, because the key number is neptunium 237, an isotope of the new man-made element 93. It is the last of the four possible families of heavy radioactive isotopes to be studied.

All the isotopes in the new family have been synthesized and their radioactive properties analyzed, Professor Seaborg reported. He also revealed that uranium 233 is also being produced in small amounts in the huge atomic piles at Hanford, Wash., out of uranium 238. This process, however, does not seem promising for the production of large amounts.

New Atomic Metal Produced in Plant

Richland, Wash.
Vallager
Mar. 11, 1948

The first small pieces of a new atomic metal, uranium 233, have been produced in the plant here, it was learned through an announcement by Dr. Glenn T. Seaborg in New York last week.

The new material does not exist in a natural state on the earth, Dr. Seaborg revealed. It is made by changing the heavy metal thorium to uranium. He said a small part of an ounce of the metal has been made in the chain-

reacting atomic piles here.

Dr. Seaborg made the disclosures in a paper which was presented in his response to award of the William H. Nichols medal of the New York section of the American Chemical society.

Plant officials had nothing further to add to the announcement, other than to confirm the fact that "small traces" of the new product had been produced, enough for research work only.

MAR 12 1949

Seaborg, Atomic Trailblazer, Marbles Champ Back In '24

A California savant, young Dr. Glenn T. Seaborg native of Ishpeming, is viewed as a likely choice for the world's highest science award, the Nobel prize.

Marbles champion in South Gate suburb of Los Angeles back in 1924, Dr. Seaborg is now recognized as the leading atomic chemist, according to William S. Barton in the Los Angeles Daily Times. Not only is he the discoverer or co-discoverer of more elements than any other scientist in this century, but numbered among the new forms of matter and two of the three substances known to be suitable for atomic bombs or atomic power. One of his atomic explosives, plutonium, was used to destroy Nagasaki.

Last year was an eventful one for the 36-year-old man. He was nominated one of America's 10 outstanding young men by the U. S. Junior Chamber of Commerce, awarded the William H. Nicholds Medal, the John Ericsson Gold Medal, and was elected to the American Academy of Sciences. Prior to that he had won the American Chemical Society's Award in Inorganic Chemistry, and been named "chemist of the year" in a poll conducted by the Chemical and Engineering News.

When Glenn was 10, his parents moved from Ishpeming to South Gate, Calif., where they still reside at 9237 San Antonio st. The father has been the foreman of large machine shops. Following grammar school where he won a temporary monopoly on marbles, Glenn was graduated at the top of his class from Jordan high school, Los Angeles.

Teacher Inspired Him

"It was my first high school chemistry teacher, Logan Reid," Dr. Seaborg recalls, "who first put the idea of chemistry into my head and encourage me. Of course, the fact that the Reids had a pretty daughter may be one reason I stopped in to get help with problems."

Reid, still at Jordan, said Glenn learned to concentrate early, and didn't have to work very hard. Young Seaborg was graduated from UCLA in 1934, making Phi Beta Kappa in his junior year despite earning part of his way. His jobs included picking apricots, oiling linotype machines for a newspaper, and janitoring.

Dr. Seaborg is professor of chemistry at the University of California, Berkeley. Another Los Angeles son of Swedish parents, Nobel Laureate Carl D. Anderson, winner in physics in 1936, is professor at Cal Tech.

Golf now has replaced marbles as the young scientist's sport. Sometimes he gets his golf scores a trifle mixed up with the atomic numbers of his new elements. While reducing his golf score from 96 to 87, he increased the number of known atoms from 93 to 96.

"Maybe four more elements remain to be discovered, but I'll be old and shooting golf in the hundreds before No. 100 is isolated," he laughs.

Awesome Prospect

When multi-billion-volt atom guns soon to be built are in operation, Dr. Seaborg feels it should be possible to produce not just new elements but the protons and neutrons of which the elements are formed. This would amount to creation of matter from energy. It would, in a sense, entail conversion of kinetic energy or speed into the elementary building bricks or creation.

"How much closer can we come, as creators of the material to emulating God?" The Time science writer wondered. Dr. Seaborg was interviewed at his parents' home.

To appreciate the significance of Dr. Seaborg's work, it is helpful to know hydrogen, Element 1, is lightest of all elements because the nucleus or heart of the hydrogen atom consists of one proton and no neutrons. Helium, element 2, containing two protons and two neutrons is about four times as heavy as hydrogen.

Credits Aides

Before Dr. Seaborg and the colleagues he insists deserve equal credits began their crucial researches, the heaviest known element was uranium. Element 92. In its most abundant form, uranium's atomic weight was 238, the sum of 92 protons plus 146 neutrons.

The difference between this U-238 and the U-235 supposedly used in the Hiorashima bomb is that U-235, containing three less neutrons, is unstable and can be exploded.

The ice was broken for the discovery of the four new elements heavier than uranium when two Berkeley scientists, McMillan and Abelson, discovered element 93 and named it neptunium for Neptune, the planet beyond Uranus. "Bullets"

Dr. Seaborg's own group then discovered elements 94, plutonium, 95, americium, and 96 curium. Naming new substances is a pleasure and privilege, according to the "Columbus of the elements," Dr. Seaborg.

Plutonium following neptunium had to be named for Pluto, the outermost planet. Americium, because it was a bit like Europium, was christened in honor of the Americas. And because curium resembled an element named for a scientist, it also was named for scientists, Pierre and Marie Curie.

Dr. Seaborg's Berkeley group in recent weeks has been producing an interesting atomic reaction he hopes will help clear up additional mysteries of matter. Tentatively called "spallation" after the verb, spall (splinter), it is proving the most powerful tool yet for probing the atom's heart. By bombardment with cyclotron bullets, the nucleus is blasted into so many fragments that they resemble those produced in nature by cosmic rays.

MAY 15-1946

David Dietz

Thorium ~~is~~ of fundamental importance in the field of atomic energy because it can be converted into an isotope of uranium which undergoes fission just as does Uranium 235.

This fact was made clear by Dr. Glenn T. Seaborg, world-famous authority on atomic energy, in his address accepting the William H. Nichols medal of the American Chemical Society.

It was Dr. Seaborg who did much of the work on plutonium which like Uranium 235 is suitable for atomic bombs.

One presumes that Uranium 233 would serve as well as either Uranium 235 or plutonium for the construction of an atomic bomb.

Until Dr. Seaborg and his colleagues succeeded in producing four "trans-uranic" elements, namely, neptunium, plutonium, americium and curium, the table of chemical elements ended with No. 92 which is uranium.

Thorium is No. 90 in the table. No. 91 is protoactinium.

Like thorium, protoactinium can be converted into an isotope which is fissionable. But the trouble with protoactinium is that so little of it exists in the world.

As a result, there is no problem about controlling protoactinium. However, it has been recognized since the end of the war that adequate international



Thorium Is Transformed Into New Source of Atomic Energy

control of atomic energy required control of the ores of thorium as well as those of uranium.

Ordinary uranium, as it is separated from its ores, is actually a mixture of several isotopes, that is, a mixture of several kinds of uranium atoms which differ from each other in weight.

These isotopes are designated by figures which express their atomic weight. Ordinary uranium consists mostly of the isotope known as Uranium 238 but it also contains slight amounts of Uranium 234 and Uranium 235.

Since it is Uranium 235 which undergoes fission, the first and obvious method of making an atomic bomb was to separate Uranium 235 from ordinary uranium.

But for the controlled release of atomic energy, one does not have to separate the Uranium 235. It is possible to place ordinary uranium in a pile of graphite. The graphite slows down the rate at which the chain reaction takes place. The structure is known as a uranium pile or nuclear reactor.

However, another reaction takes place in the uranium pile. Neutrons released by the fission of Uranium 235 are absorbed by the atoms of Uranium 238. These atoms then undergo radioactive transformations, turning first into neptunium, then into plutonium.

In similar fashion, if thorium is placed in a uranium pile, the thorium undergoes a series of transformations, absorbing neutrons and becoming Uranium 233.

ALV

U. C. Student Union to Be A Memorial

Plans for a \$5,000,000 student union building on the Berkeley campus of the University of California were announced last night at the annual Charter Day banquet at the Palace Hotel.

The building will be erected as a memorial to the university's men who served in World War II, said William M. Hale, president of the California Alumni Association.

Dr. Glenn T. Seaborg, co-discoverer of plutonium and recognized for other pioneering work in nuclear chemistry, was named "alumnus of the year" by the association.

The award was instituted in 1944, when it went to Lieutenant General James H. Doolittle for his daring raid on Tokyo.

PROFESSOR AT BERKELEY

Dr. Seaborg graduated from the University of California at Los Angeles and then took his doctorate at Berkeley. He now is professor of chemistry at Berkeley.

In accepting the Alumni Association award, Dr. Seaborg praised the university's "enlightened administration" for its "sound research traditions."

Governor Warren, a member of the university's class of 1912, said the State is facing one of its most serious financial crises because of "those in and without our State government who would abuse the reserves we have set aside for the university and other institutions."

'SENSE OF INSECURITY'

"Some of us are beginning to feel a sense of insecurity in Sacramento," he said.

Field Marshal Viscount Alexander, Governor General of Canada, who was principal speaker at the Charter day ceremonies at Berkeley earlier, also addressed the Alumni Association.

His remarks were informal, however, and he did not touch upon world affairs, which he had discussed at Berkeley.

Dr. Robert Gordon Sproul, presi-



DR. GLENN T. SEABORG
"Alumnus of the year"

dent of the university, told the banquet audience the United States "certainly" will have no war with Russia "for 10, perhaps 20, perhaps even 50 years."

He urged that the period of peace be devoted to rallying "men and women everywhere in a common cause, to a vision of well-being and reasonable security in a framework of individual freedom and opportunity."

"We should make it clear to the world that we are not fighting merely against Communism, but for a set of proved, cherished and inspiring values of our own," he said.

A chief function of universities today, he added, is "to restore belief in the possibilities of human progress."

"Universities always have known a lot more than statesmen have been able or willing to apply."

Hale said the Alumni Association decided on the new student union building as a war memorial after a comprehensive planning survey of student needs on the campus. The present Stephens Union was found to be inadequate for the increased postwar enrollment.

The Board of Regents has approved placing the new building in the area between the present administration building and the men's gymnasium, bounded by Telegraph avenue, Dana street and Bancroft and Allston ways.

TOP ATOM EXPERTS MADE THESE ATOMIC DOODLES

LOOK
3/30/48

ALMOST everyone doodles, including members of the United States Atomic Energy Commission and their advisory staff. But unlike your doodles, the doodles of these men who are shaping the nation's future in atomic energy, are examined minutely after every conference they attend. Doodles which look as if they might possibly have secret information scribbled on them are destroyed. That's because doodles are the result of your subconscious mind at work, and, subconsciously, one of these atom experts may have doodled an atomic secret. Look presents some doodles picked up after these meetings. They contain no secrets. Some of the men pictured above made them; some didn't. A psychoanalyst gives his idea of what each doodle means.



David E. Lilienthal
Chairman, Atomic
Energy Commission



W. W. Waymack
Member, Atomic
Energy Commission



Lewis L. Strauss
Member, Atomic
Energy Commission



Robert F. Bacher
Member, Atomic
Energy Commission



Sumner T. Pike
Member, Atomic
Energy Commission



J. R. Oppenheimer
Chairman, Advisory
Committee to AEC



Dr. James B. Conant
Harvard University
Adviser to AEC



Glenn T. Seaborg
University of Calif.
Adviser to AEC



I. I. Rabi
Columbia Univ.
Adviser to AEC



Enrico Fermi
Univ. of Chicago
Adviser to AEC



Cyril S. Smith
Univ. of Chicago
Adviser to AEC



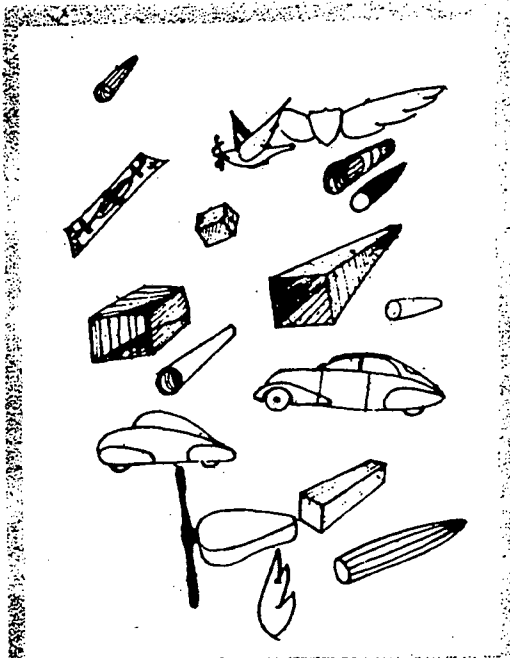
Dr. Lee A. DuBridge
Calif. Inst. of Tech.
Adviser to AEC



Hartley Rowe
United Fruit Co.
Adviser to AEC



Hood Worthington
DuPont Co.
Adviser to AEC



A dove, signifying peace, stands out here. Air Force-type wings behind the dove indicate a belief in air power as a way to peace.

GLENN T. SEABORG:

Atomåldern

Den period på omkring femtio år, varunder fenomen i direkt samband med atomkärnan varit föremål för vetenskapliga iakttagelser, har under det senaste decenniet kulminerat i en serie resultat, vilka kan sägas utgöra inledningen till den epok, som nu allmänt börjat betecknas som atomåldern. Tre av dessa resultat — upptäckten av kärnklyvningsreaktionen i december 1938, upptäckten av det syntetiska grundämnet plutonium i december 1940 och den första framgångsrika demonstrationen av neutronkedjereaktionen i december 1942 — bildar den vetenskapliga grund på vilken ett framtida, fredsmässigt utnyttjande av atomenergin kommer att byggas. Närmast följde emellertid de första atombombernas detonationer två och ett halvt år senare eller på eftersommaren 1945.

Fastän dessa epokgörande upptäckter skedde vid en sådan tidpunkt i mänsklighetens historia, att atomenergins frigörande fick sin första praktiska tillämpning i atombombens form, finns det lyckligtvis en mycket bredare grundval för denna nya vetenskapsgren. Ett vidsträckt fält av potentiella möjligheter — hur vidsträckt kan ännu inte närmare fastställas — väntar på atomenergins exploatering för fredsmässiga syften. Först när vi fått mer av det perspektiv som endast tiden och erfarenheten kan ge, blir det möjligt att med någon säkerhet säga, om denna nya insikt kommer att bli mer till gagn än skada för mänskligheten och de goda krafterna.

När det gäller atomenergins fredsmässiga användning är det främst två betydelsefulla framtidsutsikter man stannar inför; den första är atomenergins exploatering som industriell energikälla, den andra de radioaktiva biproduktämnenas utnyttjande för biologiska, medicinska och andra forskningsändamål.



För det förstnämnda fallet kommer de berömda klyvbara ämnena plutonium och uraniumisotoperna med beteckningen uranium-235 och uranium-233 att tjäna som bränsle i specialkonstruerade element för atomenergi. Det återstår emellertid många ytterst svåra problem att lösa, särskilt på det tekniska planet, innan denna tanke kan förverkligas. Det kommer därför att ta många år innan detta slags energi kan ta upp tävlan med vanliga energikällor sådana som kol. De erforderliga elementen måste arbeta vid hög temperatur för att energin skall kunna utvinnas i användbar form, och detta innebär att man ställs inför många problem när det gäller konstruktionsmaterial, frätningsprocesser etc. Konstruktionsmaterialet måste vara av sådant slag, att dess neutronabsorbering blir obetydlig, och detta begränsar urvalet till ovanliga ämnen. Lämpliga kylanordningar och en betydande kontroll att reglera reaktionen måste uppfinnas. Det blir också nödvändigt för kemisterna att utveckla metoderna för framställning av plutonium och separation av isotoper och även

GLENN T. SEABORG, 36-årig professor i kemi vid University of California, har redan rykte om sig att vara en av världens främsta atomforskare. Genom hans insatser lär tiden för konstruerandet av den första atombomben ha reducerats avsevärt, och han har bl. a. del i den betydelsefulla upptäckten av plutonium, det första syntetiska grundämnet. 1945 fick han Chicago Jr. Association of Commerce's utmärkelse till »mest förtjänte unge man i Chicago», 1946 utsågs han av kolleger till »årets kemist», 1947 fick han American Chemical Society's årliga pris för »bästa kemiska forskningsresultat, utfördt av en man under 35 år», och i år har han utnämnts till en av Amerikas »tio framstående unga män 1947» samt erhållit John Ericsson-medaljen i guld av American Society of Swedish Engineers. Han sitter också i atomenergi-kommissionens rådgivande niomannakommitté.

Seaborg är av rent svensk börd: farfadern John Eric Sjöberg var mästermekaniker vid Hällefors, innan han fann vägen till den lilla gruvstaden Ishpeming i Michigan i slutet av 1860-talet, och modern Selma Olivia Eriksson föddes i Grängesberg. Sina akademiska studier finansierade Seaborg som stuveriarbetare, laboratoriebiträde, aprikosplockare och sätтарlärling. 1931 anställdes han vid California-universitetets kemiska laboratorium och tog doktorsgraden 1937 på en avhandling om de snabba neutronernas oelastiska spridning. Blev docent 1941 och professor 1946.

att rensa dessa ämnen så, att det onyttjade bränslet kan användas igen.

Dessa problem kommer emellertid att lösas, och atomenergins fördelar kommer förmodligen att leda till, att en atomenergiindustri utvecklas i framtiden. Man bör inte glömma att atomenergins frigörelse är förbunden med radioaktiv utstrålning, och ett atomvärmelement skulle därför behöva omges av omfattande skyddsanordningar. Man kan därför anta, att atomenergin — åtminstone till en början — bäst lämpar sig för stationära anläggningar och kanske då i första hand anläggningar, vilka är belägna i sådana trakter, där tillgången på annan energi är svåråtkomlig. Det kommer aldrig att bli möjligt att använda atomvärmelement för framdrivning av vanliga bilar därför att de nödvändiga skyddsanordningarna bleve alltför tunga, men de kommer kanske att kunna användas för framdrivning av båtar eller t. o. m. stora flygplan. Det är ännu för tidigt att avgöra, om denna energikälla skall kunna hävda sig ekonomiskt i konkurrensen med t. ex. kolet, men den kommer oavsett detta att få stor betydelse på grund av sin koncentrerade form, som öppnar helt andra möjligheter än andra energikällor kan erbjuda.

Det andra fredliga bruket av atomenergin bygger på utnyttjandet av de radioaktiva biproduktämnen vid atommärkningsexperiment. Vid atommärkningen blandas ett grundämne i sin fasta form med en radioaktiv form av samma ämne. Ämnets väg genom t. ex. den mänskliga organismen eller vid ett kemiskt förlopp kan sedan lätt avläsas tack vare de radioaktiva indikatorerna. Atommärkningen åskådliggör ofta biokemiska förlopp som annars skulle vara omöjliga att följa.

Man känner f. n. omkring 500 radioaktiva ämnen av vilka de flesta erhållits på konstgjord väg genom neutronbeskjutning. De atomenergistaplar som byggdes i Förenta staterna under kriget representerar hittills oöverträffade tillgångar i detta avseende och har väsentligt bidragit till att reducera kostnaderna för

dessa radioaktiva ämnen. Oak Ridge National Laboratory i Tennessee levererade under det gångna året över tusentalet sändningar till medicinska institutioner, sjukhus, universitet samt allmänna och enskilda forskningsinstitut över hela världen. Dessa ämnen har kommit till användning i hundratals forskningslaboratorier i olika länder, inte minst i Sverige.

Det kan knappast råda någon tvekan om att folk i allmänhet föredrar att utnyttja atomenergin i dessa former framför att utnyttja den i krigiska syften. Och i själva verket tror jag inte endast att människorna sätter det fredliga bruket av atomenergin främst utan också att de radioaktiva ämnena på lång sikt kommer att bli mänskligheten till den största nytta. Antagligen får de sin största betydelse inom den medicinska terapin och diagnostiken samt för den biokemiska och medicinska forskningen. Forskningen på dessa områden fortskrider i ett ständigt ökat tempo, sedan man fått möjlighet att på grundval av radioaktiva indikatorer studera många viktiga problem. Det är t. ex. möjligt att lokalisera verkningsområdet för ett visst läkemedel, att avgöra vilken form av en ny medicin som lättast absorberas från matsmältningsorganen samt att identifiera och sålunda bli i stånd att på laboratoriet framställa nya kemiska föreningar av biokemiskt eller medicinskt värde. Genom att tillsätta radioaktiva ämnen till molekylerna av sådana ämnen som sulfapreparat, penicillin och streptomycin skall man måhända vinna ökad kunskap om hur dessa utomordentliga läkemedel verkar. Med hjälp av sådana märkningsisotoper kommer det också att bli möjligt att studera cancers utvecklingsmekanism. När man en gång kommit underfund med denna, blir utsikterna att förebygga och framgångsrikt bekämpa sjukdomen betydligt större.

Dessa radioaktiva ämnen har kommit till användning även i många andra grenar av kemisk och fysisk forskning, jordbruket, växtfysiologin, metallurgin, zoologin och många industriella forskningsområden.



JOHN ERICSSON-MEDALJEN är en förnämlig utmärkelse, som utdelas till svenska medborgare eller amerikaner av svenska härkomst som ett erkännande av utomordentliga förtjänster på det tekniska och vetenskapliga området. Medaljen utdelas vartannat år. Den förste som fick utmärkelsen var Svante Arrhenius (1926). Den 11:e medaljen i ordningen tilldelades Glenn T. Seaborg, i samband med Svenska ingenjörssamfundets i New York 60-årsjubileum i början av året. Seaborg får här medaljen av föreningens förre ordförande Eric A. Löf. T. v. föreningens nuvarande ordförande Arvid Lundquist.

University Scientists To Discuss Research At American Chemistry Meeting in Chicago

The campus faces a mass migration of chemistry department faculty to Chicago, on April 19.

Members of the department will attend the annual meeting of the American Chemical Society, and a number of the University researchers will present papers reviewing recent studies on this campus.

Wendell M. Latimer, dean of the college of chemistry, disclosed that the University group will include a number of chemists who have done research in connection with the radiation laboratory.

SEABORG KEYNOTES

Glenn T. Seaborg, professor of chemistry, renowned for his atomic discoveries, will open the convention with a keynote history and comment. A paper on the "Search for Pluto-

onium 235 in Carnotite," prepared by C. S. Garner, associate professor of chemistry; N. A. Bonnor, Washington University, and Seaborg, will be delivered.

Robert E. Connick, assistant professor of chemistry will deliver two papers on plutonium, dealing with research carried on in the University's radiation laboratory during the war. Connick said that the investigations, done under sponsorship of the Manhattan project, were significant in understanding the chemistry of plutonium for use in the atomic bomb project.

ATOMIC RESEARCH

Other papers following the theme

of nuclear and atomic research will deal with the "Tracer Chemistry of Americium and Curium," "Higher Chlorides of Uranium," "Isolation and Properties of Americium" and "Isolation and Properties of Curium."

One important paper will be read concerning the heat of vaporization of carbon. Recent investigations have given chemists cause to doubt the accuracy of former measurements of carbon thermodynamics. The changes discussed in this paper are expected to have a vital effect on certain portions of organic chemistry.

National Academy of Sciences Elects Two U.C. Scientists

DAILY CAL.

5/3/48

Glenn T. Seaborg, professor of chemistry, and Curt Stern, professor of zoology, have been elected to the National Academy of Sciences, the highest scientific honor the United States can bestow.

Addition of these men to the academy brings the total number of University faculty members holding membership to 32. The Academy, which now includes approximately 400 of the nation's outstanding scientists, functions as an advisory body on scientific policy to the government.

Seaborg, who received his Ph.D. at Berkeley in 1927, has been engaged in research on campus since that date. He has gained recognition as co-discoverer of several new elements and

artificial radioactive isotopes of elements. Working principally in the fields of nuclear chemistry and physics, Seaborg discovered the elements plutonium, americium, and curium.

Coming to Berkeley last year from the University of Rochester, Stern has received acclaim for his outstanding work in the genetics of *Drosophila* (the fruit-fly) and general genetics. Stern was chairman of the division of biological sciences and department of zoology at Rochester.

Wendell M. Latimer, dean of the college of chemistry, and Joel H. Hildebrand, professor of chemistry, have been attending the annual convocation of the Academy in Washington, D.C., and announced the election of Seaborg and Stern.

BEAK. GAZETTE 5/3/48

UC Scientists Are Named to Nat'l Academy

Election of Dr. Glenn T. Seaborg, professor of chemistry, and Dr. Curt Stern, professor of zoology, to the National Academy of Sciences today brought to 32 the total number of University of California faculty members holding membership in that elite organization.

The academy, which advises the Government on scientific policy, now numbers approximately 400 of the Nation's outstanding scientists.

Dr. Seaborg, who received his A.B. degree at UCLA and his Ph.D. at Berkeley in 1937, has been with the University since that date. His work has centered in nuclear chemistry and nuclear physics and has brought him recognition as the co-discoverer of several new elements and artificial radioactive isotopes of elements, including plutonium, americium, curium, the fissionable isotope of uranium (U-233), the long-lived isotope of neptunium (Np-237) and the 4n plus 1 radioactive series ("neptunium" radioactive series).

Dr. Stern, who received his Ph.D. degree from the University of Berlin in 1923, came to UC last year from the University of Rochester where he had been professor of zoology and chairman of the Division of Biological Sciences and Department of Zoology. He has gained recognition for his outstanding work in the genetics of *drosophila* (*drosophila* is the fruit-fly, the study of which has proved invaluable in advancing knowledge of genetics) and general genetics.

TWO UNIVERSITY SCIENTISTS,
Chemist Glenn T. Seaborg '34 and Zoologist Curt Stern, have been elected to the National Academy of Sciences, highest scientific honor in the United States.

26 CAL. MONTHLY 5/48

MAY -- 1948



Chemist [See Job Barometer, P. 86]

115
Time was when life was simple and there were only 92 known chemical elements. In 1940, Neptunium threw its hat in the ring, and then, in rapid-fire succession, young Glenn T. Seaborg and his associates turned up with elements 94, 95, 96—plutonium, americium, curium. The latter two were announced to the world in a most unorthodox manner.

Seaborg was to reveal the discovery of these two elements at a chemical symposium at Northwestern during the summer of 1944. Earlier that week, however, Seaborg was a guest on the Quiz Kids' program, was asked to name the known elements beyond uranium and spilled the beans.

Seaborg, a full professor at the University of California, was borrowed from that school during the war by the "Manhattan Project"—the atomic research program, and wasn't returned until 1946. He was appointed by the President to serve on the nine-man General Advisory

BERK. GAZETTE 5/13/48

Chemists Honor UC Scientist

For the second consecutive year the American Chemical Society Award in pure chemistry has been won by a University of California scientist, according to an announcement by the society's president, Dr. Charles A. Thomas.

Winner of the \$1000 prize for 1948 is Dr. Saul Winstein, professor of chemistry in the University of California at Los Angeles.

Last year's winner was Dr. Glenn T. Seaborg, noted nuclear chemist now on the Berkeley campus. In their student days, Seaborg and Winstein were classmates on the Los Angeles campus, both graduating as majors in chemistry in 1934.

COVETED HONOR

One of the most coveted scientific honors, the award is made annually to a North American chemist under 35 who has made an outstanding contribution to chemical research.

The principal basis of this year's award was the series of fundamental investigations by Dr. Winstein concerning the mechanisms by which atoms move in and out of molecules during chemical processes whereby new substances are being created. A modern pioneer in the new field of physical-organic chemistry, Winstein has specialized in research on the influence of groups of atoms on other atoms or atomic groups.

Committee to the Atomic Energy Commission, and is also consultant to General Electric's atomic research program. In 1946, a national poll of chemists named Glenn "chemist of the year"; in 1947 he won the \$1,000 Pure Chemistry Award for the best chemical research of the year by a man under 35; was named one of the ten outstanding U.S. young men of 1947 by the Junior Chamber of Commerce, and received from the American Chemical Society, the William H. Nichols Medal, one of the highest honors in chemical science.

Born in Ishpeming, Michigan, of Swedish ancestry, he moved to California with his family at the age of 10 and got interested in science in high school. He worked his way through college as a stevedore, fruit picker, and linotype apprentice. Graduated from U.C.L.A. in 1934, he got his Ph.D. in 1937, and became an instructor at the University of California two years later. He is now working on transuranium research and teaching nuclear chemistry.

BIRD & GAZETTE

Drs. Seaborg And Stern ^{5/10/47} Are Honored

Dr. Glenn T. Seaborg, professor of chemistry, and Dr. Curt Stern, professor of zoology, University of California, have been elected to the National Academy of Sciences.

The Academy advises the Government on scientific policy and has 32 University of California faculty members on its rolls.

Dr. Seaborg has specialized in nuclear chemistry and nuclear physics. His work has brought him recognition as the co-discoverer of several new elements and artificial radioactive isotopes. He has been with the University since 1937.

Dr. Stern, a Ph. D. from the University of Berlin in 1923, has gained recognition in the study of genetics of the fruit-fly and general genetics.

Fission of Bismuth, Valueless as Bomb, Described to Chemists Here

An atomic energy explosion as much faster than the fission that fires the atomic bomb as a second is to a thousand years, but useless as bomb material, was described to the American Chemical society Thursday by two noted nuclear chemists of the University of California's radiation laboratory.

Dr. Isadore Perlman and Dr. H. H. Goeckermann described the new nuclear explosion process in which an atom of bismuth is struck by a 200,000,000-volt particle of heavy hydrogen. The bismuth turns into another element, polonium, which being highly unstable, throws off a dozen or so neutrons in a fraction of a billionth of a second.

Speed of the fission that sets

off the atomic bomb is rated at a small fraction of a millionth of a second, which makes the bomb blast ridiculously slow when compared to the new process.

Two New Groups Cited

The process is useless for bombs because bismuth does not have the self-starting properties present in the conventional bomb materials, uranium and plutonium. The scientists said bismuth and other substances such as lead and tantalum have to be exploded in a giant atom smasher.

Discovery of two new groups

of radioactive elements was related by Dr. Glenn T. Seaborg, also of the University of California, and a co-discoverer of plutonium. They are produced by bombarding thorium with moderately-high-voltage particles of heavy hydrogen, he said.

The thorium goes through a weird series of changes depending on how it reacts to the bombardment of the hydrogen particles, and on the direction from which bombarding particles strike their target.

Substance Changes

One series of conversions results in the formation of proactinium with an atomic weight of 228 units. Successively in the progress of change the substance becomes actinium, francium and astatine (these two being newly-discovered elements) and finally it becomes a form of bismuth, also starts with proactinium, but

The other chain of conversions it has an atomic weight of 227, and each succeeding element in this chain is one unit lighter than those of the first process described.

The new radioactive elements

were created in the giant syclo-tron of the University of California at Berkeley, Dr. Seaborg's collaborators were Dr. Albert Chiorso and Dr. W. W. Meinke.

The scientists spoke at sessions of the division of physical

and inorganic chemistry, nuclear reactions section, at the Masonic temple, where four-day sessions of the 114th meeting of the American Chemical society were concluded Thursday afternoon.



Man-Made Plutonium Called World's Only Atomic Threat

BY ARTHUR J. SNIDER

Staff Science Writer.

If the world goes up in a big mushroom-shaped puff of smoke, man has only himself to blame.

For Mother Nature hasn't left lying around enough plutonium, the stuff atomic bombs are made of, to do the job.

Only insignificant traces are to be found, three scientists told the American Chemical Society's international conference in the Stevens Hotel Tuesday.

More Radium

Plutonium is a million times scarcer than radium in nature, an analysis of radioactive ores reveals, according to Profs. C. S. Gardner and Glenn T. Seaborg of the University of California and N. A. Bonner of Washington University, St. Louis.

For bomb purposes, an extensive plutonium production plant operates at Hanford, Wash. Its chemical separation from uranium was worked out at the University of Chicago.

Weigh Americium

Isolation of the first weighable amounts of the

radioactive element, americium, which is produced in the disintegration of plutonium, was reported by Prof. B. B. Cunningham of the University of California.

The amount is so small that all delicate chemical operations had to be carried out under a microscope. The test tubes were about as large in diameter as a fine sewing needle and only a fraction of an inch in length. The scale itself weighed only one-three-hundredths of an ounce.

Gazette

NOVEMBER 15, 1948

Cyclotron Work Progress Told At UC Conclave

The creation of twenty new artificially radioactive isotopes in the region of the heavy elements by the giant cyclotron at the University of California has brought scientists a new understanding of the patterns of radioactivity.

This was disclosed today by Dr. Glenn T. Seaborg, professor of chemistry in the university, in a paper delivered to the annual meeting

on the Berkeley campus of the National Academy of Sciences. The research was done as a part of the research program for the Atomic Energy Commission.

Dr. Seaborg said that the new isotopes, relatives of naturally occurring elements, are of a kind which lower energy atom-smashers have not been able to make except in a few instances. These isotopes are described as neutron deficient.

Dr. Seaborg explained that most naturally occurring elements have a dominant stable isotope, which is not radioactive. In lower energy atom-smashing experiments, the

radioactive isotopes created usually are slightly heavier than the stable isotope, having one or more extra neutrons.

PRODUCE ISOTOPES

But in ultra-high energy bombardments by the 184-inch cyclotron, isotopes lighter than the stable element are produced. These are the "neutron deficient" isotopes, so called because they have fewer neutrons than the stable isotope.

About twenty such isotopes have been produced in bombardments with the giant cyclotron, ranging from bismuth to uranium.

In the case of thorium and actinium, both of which have natur-

Two of the Nation's leading physicists impart data in their highly specialized fields at the National Academy of Science meeting at the University of California. They are Dr. Glenn T. Seaborg (left), Nobel prize-winner in nuclear physics and a U.C. professor of chemistry; and Dr. Edwin M. McMillan, who aided in the development of the atom bomb.

ally occurring radioactive isotopes, a new family of artificially radioactive isotopes has been discovered for each element.

Studies of the periods of radioactivity of these new isotopes has made it possible for Dr. Seaborg and his colleagues to elucidate definite patterns of radioactivity which have been unknown previously.

DECREASING WEIGHT

For example, it has been found that, in all the elements from bismuth to curium, the energy of alpha particles ejected by radioactive atoms becomes progressively greater, in a given element, with decreasing weight of isotopes.

Most of the new isotopes have short periods of radioactivity. Some have half-lives, periods in which they lose half their radioactivity, as short as a hundred thousandths of a second, while others have half-lives which extend to a period of hours or days.

From these studies it is also possible to learn more about conditions prevailing when the earth was "born" about two billion years ago. Presumably all of the new isotopes occurred in natural form at the birth of the earth, and became extinct as their radioactivity disappeared.

1/12/54
**Nobel Winner
To Talk at SBC**

Santa Barbara paper
The free public lecture by Dr. Glenn T. Seaborg, outstanding atomic scientist and Nobel Prize winner, to be given tomorrow at 4 p.m. in the UCSCB Riviera campus auditorium, will include a description of the three important scientific discoveries which ushered in the nuclear age.

These three events—the discovery of the nuclear fission reaction in 1938, discovery of the synthetic element plutonium in 1940, and the first successful self-sustaining nuclear chain reaction in 1942—furnish the basic scientific background upon which the future of peacetime "nucleonics" will stand. Dr. Seaborg is the co-discoverer of plutonium and several other elements.

A-Bomb Element Discoverer Likely to Win Nobel Prize

Dr. G. T. Seaborg, Former South Gate Boy, Called Leading Atomic Chemist

BY WILLIAM S. BARTON

South Gate's 1924 marbles champion is likely to win the world's highest award—the Nobel Prize. He is recognized as the leading atomic chemist. Not only is he the discoverer or codiscoverer of more elements than any other scientist in this century, but numbered among the new forms of matter are two of the three substances known to be suitable for atomic bombs or atomic power. One of his atomic explosives, plutonium, was used to destroy Nagasaki.

If, in the next year or so he should win the most coveted prize, he will become the second product of local schools to be so honored. Nineteen forty-eight was an eventful year for 36-year-old Dr. Glenn T. Seaborg.

In the span of a few months he was named one of America's "10 outstanding young men" by the U.S. Chamber of Commerce, was awarded the William H. Nicholds Medal, the John Ericsson Gold Medal, and was elected to the American Academy of Sciences.

Just before that, he had won the American Chemical Society's Award in Pure Chemistry, and been named Chemist of the Year in a poll conducted by Chemical and Engineering News.

Swedish Parents

When Glenn was 10, his parents, both Swedish, moved from a Michigan mining town to South Gate where they still reside at 9237 San Antonio St. The father has been the foreman of large machine shops. Following grammar school where he won a temporary monopoly on marbles, Glenn was graduated at the top of his class from Jordan High School, Los Angeles.

"It was my first high school chemistry teacher, Logan Reid," Dr. Seaborg said, "who first put the idea of chemistry into my



'SAVANT' — Dr. Glenn T. Seaborg, Angeleno famed for atomic studies.

Wide World photos

head and encouraged me. Of course, the fact that the Reids had a pretty daughter may be one reason I used to stop in to get help with problems."

Similarity in Men

Asked for an opinion of his pupil, Reid, still at Jordan, asserted that, "Glenn learned to concentrate early and didn't seem to

have to work very hard." Young Seaborg was graduated from the University of California at Los Angeles in 1934, "making" Phi Beta Kappa in his junior year despite earning part of his way. His local jobs included picking apricots, oiling linotype machines for a newspaper, and janitorial.

There are similarities between

Dr. Seaborg and Dr. Carl D. Anderson who won the Nobel Prize in physics in 1936. Both are Los Angeles school products, have Swedish parents, and are tall and dark. Dr. Seaborg, however, is professor of chemistry at the University of California, Berkeley, while Nobel Laureate Anderson is professor of physics at California Institute of Technology.

To appreciate the significance of Dr. Seaborg's work, it is helpful to know that the reason hydrogen, or Element 1, is the lightest of all elements is that the nucleus, or "heart" of the hydrogen atom consists of one proton and no neutrons. Helium, Element 2, containing two protons and two neutrons, is about four times as heavy as hydrogen.

Before Dr. Seaborg and the many colleagues he insists deserve equal credit began their crucial researches, the heaviest known element was uranium, element 92. In its most abundant form, uranium's atomic weight was 238, the sum of 92 protons plus 146 neutrons.

The difference between this U-238 and the U-235 supposedly used in the Hiroshima bomb is that U-235, containing three less neutrons, is unstable and can be exploded.

"The ice was broken for the discovery of the four new transuranium elements (those heavier than uranium)," the chemist explained, "when Drs. E. M. McMillan and P. H. Abelson of Berkeley discovered element 93, and named it neptunium for Neptune, the planet beyond Uranus."

Dr. Seaborg's own group then discovered elements 94 (plutonium), 95 (americium), and 96 (curium). Moreover, groups headed by the chemist, have discovered dozens of heretofore unknown forms of these and other elements. Among these is a new form of uranium, U-233, presumably as effective for atomic bombs and power as U-235 and plutonium.

Likes to Play Golf

Golf, now, has taken the place of marbles as Dr. Seaborg's favorite sport. You can't blame him for getting his golf scores a trifle mixed up with the atomic numbers of his new elements. For, during the time he has succeeded in reducing his golf score from 96 to 87, he has increased the number of known atoms from 93 to 96.

"It's possible," he said, cautiously, "that four more elements remain to be discovered. One hundred could be the last one, but the chances are that I'll be old and shooting golf in the 'hundreds' before that is isolated."

Naming new substances is fun, according to the "Columbus of the elements." Plutonium, following neptunium, had to be named for Pluto, the outermost planet. Americium, because it was a bit like Europium, was christened in honor of the Americas. And, because Curium resembled an element named for a scientist, it, also was named for scientists, the elder Curies.

Interesting Reaction

More recently, Dr. Seaborg's Berkeley group has been producing an interesting atomic reaction he hopes will help clear up additional mysteries of matter. Tentatively called "spallation," after the verb, spall (splinter), it is proving the most powerful tool yet for probing the atom's heart. By bombardment with cyclotron "bullets," the nucleus is blasted into so many fragments that they resemble those produced in nature by cosmic rays.

When the multi-billion-volt atom guns soon to be built are in operation, Dr. Seaborg predicted in an interview at his parents' South Gate home, it should become possible to produce, not just new elements, but the protons and neutrons of which the elements are formed. This, in short, would amount to a true creation of matter from energy. It would, in a sense, entail the conversion of kinetic energy, or sheer speed, into the elementary building bricks of creation.

How much closer can men come (as the creators of the material) to emulating God?

SOUTH GATE DAILY SIGNAL 11/31/49
WHOLE SCIENTIFIC WORLD WATCHES THEIR SON



FAMOUS SON'S PARENTS—Mr. and Mrs. Theodore Seaborg of 9237 San Antonio ave., South Gate, gaze fondly at picture of their son, Dr. Glenn Seaborg, the world's leading atomic chemist. The Seaborgs moved to South Gate when Glenn, now professor of chemistry at University of California, Berkeley, was 10 years old.

—Signal Photo.

Glenn T. Seaborg '34



GLENN T. SEABORG '34

Seaborg Named Alumnus of Year

3-23-49

Glenn T. Seaborg '34, co-discoverer of the fissionable material used in the second atomic bomb dropped on Japan, was named "Alumnus of the Year" at the 81st annual Charter banquet March 23 in the Garden Court of the Palace hotel in San Francisco.

A graduate of the Los Angeles campus with a graduate degree from the Berkeley campus, Seaborg was described by

Alumni association president William M. Hale '14 as "finest product of two campuses of alma mater, gifted nuclear chemist, transilient explorer of the dim horizons of the unknown, precursor of human understanding and achievement . . . one of the progenitors of a new and dynamic branch of knowledge."

In accepting the award, presented annually to the alumnus who has achieved the highest distinction upon an international basis, Seaborg paid tribute to the policy of the University and the foresight of its chemistry department which made his discovery possible. Named "Chemist of the Year" in 1946 by the Chemical and Engineering News, he has recently discovered five collateral radioactive series which have greatly increased knowledge of radioactivity.

Guest speaker at the banquet was Viscount Harold R. L. G. Alexander, governor-general of Canada, who was awarded an honorary degree at Charter exercises on the Los Angeles campus. As in his address earlier in the day in the Greek theater, he praised the friendly relations between the United States and Canada and hoped they might afford an example for world peace.

In the major address, President Robert Gordon Sproul '13 strengthened hopes for peace with the opinion that "there will be no war for 10, perhaps 20 years, perhaps even 50 years, because the USSR is not, and for this length of time will not be able to wage a successful military war."

Governor Earl Warren '12 warned alumni that current efforts to spend state reserves is "one of the most serious crises in recent California history . . . (which) might set the educational institutions of this state back a generation."

At Charter exercises earlier in the day, honorary degrees were conferred upon Frank Adams, professor emeritus of agriculture, and Edwin P. Hubble, Mt. Wilson observatory astronomer.

Regents O. K. Union Plan

Approval by the Regents of a proposed war memorial student union on the Berkeley campus was disclosed at the Charter banquet by William M. Hale '14, president of the California Alumni Association.

In accepting a report from a committee headed by Fleet Admiral Chester W. Nimitz, the Regents authorized the President to name a joint union building committee to prepare a building program and financing procedure for the union. The committee will include alumni, students and representatives of the University administration.

The recommendation of the Alumni Council that the union be erected on the land between the Administration building on Telegraph avenue and the Gymnasium for Men on Dana street was accepted by the Regents with the condition that it receive the concurrence of the committee on grounds and buildings and that construction be commenced within six years.

The report by Regent Nimitz followed a study of findings in the \$30,000 survey "Students at Berkeley" conducted during the past year by the Alumni Association and a conference with representatives of the Association and the ASUC.

Two Former Managers Die

Two former graduate managers of the ASUC died suddenly last month: Milton T. Farmer '09 and Kenneth Priestley '26. Both had been active in many campus organizations.

Former Judge Farmer was stricken in Chicago en route home from Washington where he had represented San Joaquin valley clients in an irrigation case before the Supreme court. He was a nationally-known water rights attorney, a member of the law firm of Athern, Chandler and Farmer, and had served on the Kern county superior bench 1914-1917.

Former editor of the *Daily Californian* and one-time head of the ASUC athletic news bureau, Priestley had served as business manager of the University's radiation laboratory since 1942. His father was the late Herbert I. Priestley, eminent University historian.



NEARLY 1000 ALUMNI FILLED THE PALACE HOTEL'S GARDEN COURT FOR 81st ANNUAL CHARTER BANQUET. (Moulin photo) 00307

'Divided World' Is Theme Of Sproul Talk to Alumni

Banquet Climaxes Charter Day Observance

"The world of 1949 is becoming divided into two basically opposed forms of society, the totalitarian as exemplified by Russian Communism and the individualistic as exemplified by American democracy."

Thus University of California Pres. Robert Gordon Sproul had summarized today for 1000 members of the UC Alumni Association the "different and menacing relations that contrast sharply with those we Americans happily share" with Canada.

The remarks closed President Sproul's commendation of Viscount R. L. G. Alexander, governor-general of Canada, as a guest and Charter Day speaker. The alumni banquet, held last night in San Francisco, culminated observances of the eighty-first charter anniversary of the University of California.

During the banquet, plans for a new student union building on the Berkeley campus were revealed. The building will be constructed as a memorial to Californians who served in World War II and the announcement of Regent approval of the plan and site was made by William M. Hale, president of the association. The site is between the administration building and the men's gymnasium, bounded by Telegraph Ave., Dana St., Bancroft and Allston Way.

ALUMNUS OF YEAR

At the same time, Glenn T. Seaborg, co-discoverer of the fissionable material used in the atomic bomb, was named the University's "alumnus of the year." In 1946 Seaborg was named "chemist of the year" by the Chemical and Engineering News. In the past year he has discovered five collateral radioactive series which have greatly increased knowledge of radioactivity.

During his sobering outline of realities facing the postwar world, President Sproul said, "It is difficult to be optimistic about the future. Yet I am far from believing that the cold war which now chills

all men with its polar drafts must degenerate into the clash of arms."

RUSS 'TRUMP CARD'

"Certainly," he continued, "there will be no war for 10, perhaps 20 years... because the USSR is not and for this length of time will not be able to wage a successful military world war. As for the United States, I cannot do better than quote a member of the Russian Foreign Office whom I met in Moscow in 1945 and said to me, 'we have a trump card. The United States will never declare war on us. We can declare war on you whenever we are ready.' My considered opinion is that this situation gives our side at least 10 years of uneasy truce to be followed by atom bombs, guided gas and epidemic bacteria unless within that period we can organize the world, preferably with Russia, but if necessary without her for a just and durable peace.

"How shall we organize a durable peace? I have no detailed guide to offer you... Of one thing I am sure, that these states whose way of life is based on responsible freedom, generous tolerance, a government of laws rather than of men, and the primacy and integrity of the individual should make no compromise.

"For no nation can be collectivistic and democratic at the same time. The reconciliation of dogmatic collectivism with open-minded liberty has never been worked out and never will be."

FEAR NOT ENOUGH

President Sproul urged an aggressive confidence. "The theme of our world strategy has been largely negative, not pro-democratic or even pro-American but simply anti-totalitarian. This offers to mankind in distress no invigorating alternative to alluring promises of the future and even some material advantages of the present... We should make it clear to the world that we are not fighting merely against Communism but for a set of proved, cherished and inspiring values of our own. The democracies cannot hope to triumph unless they are armed with confidence in the validity of their ways of life.

"Fear and anger and atom bombs are not enough. We must rally men and women everywhere in a common cause to a vision of well-being and reasonable security in a framework of individual freedom and opportunity."

The university's president pointed to education to "set the pace for law." He admitted that America has gone farther than any other country in the conquest of ignorance "but it has not gone far enough... It is not too much to say that the destiny of mankind today depends upon the clarity of thinking of such men and women as are here tonight of every race, nationality and faith.

"Let us go forward together," he concluded, "with malice toward none but with a firm determination that we will not be bullied or pushed aside from our course, that we will stand or fall by what we know to be right."

U.C. ASSURED OF NEW \$5,000,000 STUDENT UNION

OAKLAND TRIBUNE 3/24/49

A new \$5,000,000 student union building as a war memorial on the Berkeley campus is assured, University of California graduates were told last night at a Charter Day Alumni Association banquet at Palace Hotel, San Francisco, as Dr. Glenn T. Seaborg, nuclear chemist, received plaudits as "the alumnus of the year."

Approval of a site by the Board of Regents for the proposed student union in the area bounded by Telegraph Avenue, Dana Street and Bancroft and Allston Ways was announced by President William M. Hale.

RECEIVES AWARD

Dr. Seaborg, co-discoverer of plutonium used in the second atomic bomb dropped on Japan, received an award presented annually to the California alumnus, who has achieved the highest distinction upon an international basis—an honor first accorded General James

H. Doolittle in 1944 for his daring air raid on Tokyo two years previously.

GIFTED NUCLEAR CHEMIST

A graduate on the Los Angeles campus, with a higher degree from Berkeley, where he is professor of chemistry, Dr. Seaborg was described by Hale as "the finest product of two campuses of our alma mater, gifted nuclear chemist, transilient explorer of the dim horizons of the unknown, precursor of human understanding and achievement, a progenitor of a new and dynamic branch of knowledge."

Named "chemist of the year" in 1946 by the Chemical and Engineering News, Dr. Seaborg during the past year has discovered five collateral radioactive series, which have greatly increased knowledge of radioactivity.

Plans for the new student union building, long under discussion on the campus and in alumni circles,

were disclosed to graduates last night by Hale with a report that official approval had been given the project by the Board of Regents.

"The Alumni Association has just completed a comprehensive planning survey of student needs," the alumni president reported to 1000 graduates. "As a result it has recommended that a student union be built as a fitting, living memorial to the 25,000 Californians who were in World War II and the 600 who gave their lives in the great conflict."

STUDENT UNION

To be located, when financing of the project is completed, between the Administration Building and the Men's Gymnasium outside Sather Gate, the student union is planned to contain an auditorium, theater and other facilities not now accorded on the campus.

Hale warned alumni "that we

have a big job ahead of us" as he announced appointment of a committee of three alumni, three students and three representatives of the University administration to make specific and definite plans for the undertaking.

TELLS OF PART

"It will be our opportunity and responsibility in the coming months," he told alumni, "to play a very important part in planning and financing the tremendous undertaking. Something like \$5,000,000 will be needed to do the job and we are going to raise a considerable portion of that amount."

"There is no cause more worthy than this one. Here will be a great memorial and a living one, a monument to Californians by Californians, for Californians. We can render no finer service to our University."

Glenn T. Seaborg named U.C. 'alumnus of the year'

Glenn T. Seaborg, co-discoverer of plutonium, was named the University's "alumnus of the year" last night at the annual Alumni association Charter Day banquet in San Francisco.

During the past year, while serving as professor of chemistry, Seaborg discovered five collateral radioactive series which greatly extended knowledge of radioactivity.

In 1946 the new "alumnus of the year" was named "chemist of the year" by the Chemical and Engineering news. This honor was accorded in recognition of Seaborg's numerous achievements while serving with the Atomic Energy commission.

The atomic scientist is currently engaged in research on certain results produced by the operation of the 184-inch cyclotron and directing graduate students in the field of nuclear chemistry.

In presenting the leather-encased scroll, a symbol of the honor bestowed upon an alumnus each year, toastmaster William Hale, president of the Alumni association, said to Seaborg:

"A gifted nuclear chemist and transilient explorer of the unknown... you are one of the progenitors of a new and dynamic branch of knowledge."

A-Bomb Scientist Becomes Father

BERKELEY, April 23.—Dr. Glenn T. Seaborg, 37, as one of the world's outstanding chemists, helped to make the atomic bomb.

But he found another force last night as hard to manage as the atom—old Doc Stork.

The nuclear chemist had his first face to face meeting with the stork when the bird swooped into the Seaborg home at 2808 Ellsworth Street, before an ambulance could be called.

The baby, the third for Dr. Seaborg and his wife, Helen, 32, arrived in record time with the scientist and a maid, Miss Effie Anderson, officiating.

BIT EXCITED

Dr. Seaborg admitted he was a little excited, but said everything was under control and events took place as expected.

The mother and the baby, a fine healthy boy, were later removed to Alta Bates Hospital, where both were reported in excellent condition.

The youngster is, as yet unnamed and unweighed. The Seaborgs have two other children, a boy, Peter, 3, and a girl, Lynne, 1½.

Exactly a month ago Dr. Seaborg was named "alumnus of the year" at a University of California Charter Day Alumni Association banquet.

NOTED CHEMIST

Professor of chemistry on the campus, Dr. Seaborg is not only the discoverer or co-discoverer of more elements than any other scientist in this century, but has found two of the three substances known to be suitable for atomic bombs or atomic power. One of his explosives, plutonium, was used to destroy Nagasaki.

This Clipping From
SANTA FE, N. M.
NEW MEXICAN

Chemical Society To Hear Seaborg Speak Wednesday

LOS ALAMOS, May 1.—The New Mexican section of the American Chemical society will meet Wednesday evening at 8 in Mesa school auditorium. Dr. Glenn T. Seaborg will speak on "chemical inferences concerning electronic structures of heaviest elements."

Dr. Seaborg received his BA from UCLA in 1934 and his Ph. D. from the University of California in 1937. He remained at the University of California until 1942 and then joined the metallurgical laboratories at the University of Chicago. Dr. Seaborg has won widespread recognition for his work on the heaviest elements, especially plutonium, uranium, americium and curium. He rejoined the staff of the University of California at the end of the war.

OAKLAND TRIBUNE

Sproul, Seaborg Will Address ASME Meet

6/1/49

President Robert Gordon Sproul, of the University of California, and Glenn T. Seaborg, U.C. chemistry professor and member of the general advisory committee to the U.S. Atomic Energy Commission, will take leading speaking roles in the semi-annual meeting of the American Society of Mechanical Engineers in San Francisco late this month.

Seaborg, 37-year-old scientist who discovered many of the important atomic elements, will speak at a five-man panel session on June 29, the third day of the five-day meeting. Topic of the panel will be "The Engineer, His Opportunity for Service to Help Create a Better and More Livable World—Materially and Spiritually."

Sproul will speak on "The Engineer and the World Outlook in the Atomic Age" during the society's banquet that night in the Palace Hotel.

The meeting will be held in U.C.'s Extension Building in San Francisco beginning June 27. More than 2000 scientists and engineers are expected to attend the conference at which some 100 authors of papers and symposium speakers will take part in 27 technical sessions.

Seaborg to Talk on Atom Energy

Nuclear energy for industrial power will be discussed by the co-discoverer of fissionable isotopes, plutonium-239 and uranium-233, June 29 in the University of California Extension Building, 540 Powell-street.

Speaking before the American Society of Mechanical Engineers, Glenn T. Seaborg will present the topic, "The Engineer, His Opportunity for Service to Help Create a Better and More Livable World—Materially and Spiritually."

Seaborg, 37, is a member of the General Advisory Committee to the U. S. Atomic Energy Commission and a professor of Chemistry at the University of California.

Also on the program is a paper on the instrumentation for an atomic power plant by two General Electric engineers, David Cochran and C. A. Hansen, Jr. Both are from the Knolls Atomic Power Laboratory at Schenectady, New York.

Releasing of atomic energy gave rise to sociological as well as material problems in society. Talks by James M. Todd, president of the society and Robert Gordon Sproul, president of the University of California, will deal with the concern of technical men with such problems. They will speak at a June 29 banquet.

Technical sessions on rockets, robots, steam and wet wood, and synthetic liquid fuels also will be held and talks will be delivered on these subjects during the five-day meeting, June 27 to July 1.

Oak. Tr. S. 2/1/49?

SPROUL TO ADDRESS MECHANICAL ENGINEERS CONCLAVE

<p>Noted engineers of the American Society of Mechanical Engineers in the Bay area beginning June 27 will the Bay Area beginning June 27 will hear an address by Dr. Robert G. Sproul, University of California president, and by Dr. Glenn T. Seaborg, U.C. professor of chemistry. In addition, the engineers will in-</p>	<p>spect the University's cyclotron at the Radiation Laboratory. Dr. Sproul will speak at the Palace Hotel, San Francisco, at a banquet June 29. His subject will be "The Engineer and the World Outlook in the Atomic Age." Professor Seaborg, co-discoverer of fissionable isotopes and a number of other chemical syntheses, will take part June 29 as a member of a</p>	<p>world panel discussing "The Engineer. His Opportunity For Service to Help Create a Better and More Livable World — Materially and Spiritually." He will examine possibilities of using atomic energy for industrial power and give estimates as to how long it will be before this source of energy can be harnessed for peacetime uses.</p>
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6/17/49 ?

Cites Potential Uses of Nuclear Energy

Glenn T. Seaborg says, in addition to serving large industrial plants, it can be used to propel large ships, submarines and airplanes. Will enable establishment of industries in isolated regions, but shielding from radiation is difficult problem.

Nuclear energy probably never can be utilized to run automobiles or locomotives, but it can be used to propel large ships, submarines and airplanes, Glenn T. Seaborg, atomic scientist, stated in an address at the semi-annual meeting of The American Society of Mechanical Engineers in San Francisco, on June 29.



Glenn T. Seaborg

Mr. Seaborg, who is a member of the General Advisory Committee to the U. S. Atomic Energy Commission, professor of chemistry at the University of California and co-discoverer of fissionable isotopes plutonium-239 and uranium-233 and of plutonium (atomic number 94), americium (atomic number 95), and curium (atomic number 96), spoke at ASME meeting headquarters in the University of California Extension Building.

Because of bulky shielding requirements, atomic energy plants will be best suited to stationary structures, at least at first, Mr. Seaborg said, but it is quite possible that such machines can be developed for mobile units where limitations on space and weight are not too great.

Isolated Regions First

"Thus the earliest uses (of atomic energy plants) could profitably be in isolated regions where there is need for additional power," he said. "There is no reason, however, why nuclear reactors cannot eventually be adapted to seagoing vessels, especially large ships. It may even be feasible sometime in the future to use power plants of this type in large submarines, giving to such vessels the advantage of very long cruising ranges. It is also probably not out of the question that eventually such power plants might be used for propulsion of very large airplanes which are being planned for the future. It does not seem that it will ever be possible to use this source of energy for propulsion of ordinary automobiles or even locomotives."

Before any of these uses can be made of atomic energy, a number of difficult problems must be solved—and that will take time, Mr. Seaborg told ASME members. It should be possible within the next few years to build a machine that will produce enough useful energy to run a small electrical generator, he estimated, and within a decade, to build a power plant that can produce useful energy on the scale of a hundred thousand kilowatts.

Large Industry Stature

From this point it is technically feasible for atomic power plants to develop to the stature of large industry, said Mr. Seaborg, but he did not think any appreciable fraction of the world's energy would be produced in this manner for several decades.

"It is not out of the question that atomic energy will eventually compete economically with coal as a source of energy," he said, "but it is also quite possible that this will never be the case except for localities where transportation difficulties make the price of coal very high."

Even should the atomic source never provide cheaper energy than the present common sources, it still will have an important, though more limited, future because of its advantages as a compact and almost inexhaustible source of energy, Mr. Seaborg pointed out. One pound of fissionable material is equivalent to about 10 million kilowatt hours of heat energy, he explained. Thus, one pound burned per day and converted to electrical power could supply the power and light needs for a city of hundreds of thousands of people.

Problems To Be Solved

Problems that must be solved before atomic energy can be made useful are largely engineering, Mr. Seaborg continued. The machines must run at high temperatures in order to extract the energy in useful form, he explained, and this means there will be problems involving materials of construction. Construction materials also must be chosen from those whose neutron absorption is small, he said, and this limits the choice to uncommon substances.

"Adequate coolants which do not absorb neutrons must be found and a method for control of the reaction must be assured," he continued. "It will also be necessary for the chemists and chemical engineers to develop very efficient procedures to purify the plutonium and uranium and also to repurify these materials in order that the unburned fuel may be used again."

The staggering amount of radiation emanating from a pile operating at a high power level makes it necessary to enclose the power pile within thick walls of concrete, steel or other absorbing material, Mr. Seaborg said. And this creates other problems, for

the shielding material must be constructed so that the pile may be loaded and unloaded and the coolant carried in and out. Yet the shields must be not only radiation tight, but air tight, since air exposed to the radiation of the pile would become radioactive.

Prof. Seaborg Plans Address

BERK. GAZETTE 9/13/49
Prof. Glenn T. Seaborg of the University of California, co-discoverer of plutonium and member of the Atomic Energy Commission's general advisory board, is one of the top nuclear chemists whose views on nuclear science teaching will be heard at a symposium featuring the silver anniversary meeting of the American Chemical Society's Division of Chemical Education in Atlantic City, N. J., the week of Sept. 18.

The divisional sessions, in which several hundred high school and college chemistry teachers will participate, will be part of the society's 116th national meeting.

A silver jubilee luncheon will be held by the educators in the Hotel Jefferson on Tuesday, Sept. 20, at which Prof. Norris W. Rakestraw of the Scripps Institute of Oceanography, La Jolla, Calif., will speak on the topic "How Far Have We Gone and How Far Shall We Go?" Prof. Rakestraw is editor of the "Journal of Chemical Education," published by the Division.

The symposium on atomic science teaching will be held that afternoon, with Dr. Ralph T. Overman of the Oak Ridge Institute of Nuclear Studies presiding.

DAILY CAL. 9/14/49
**Seaborg slated
to address meet**

Glenn T. Seaborg, professor of physics and co-discoverer of plutonium, will address a meeting of the American Chemical Society's Division of Chemical Education next week.

Honoring the silver anniversary meeting of the organization, Seaborg, together with Ralph T. Overman of the Oak Ridge Institute of Nuclear Studies, will discuss techniques used in atomic science teaching at the University.

Several hundred high school and college chemistry teachers will also participate in the society's 116th national meeting to be held in Atlantic City, New Jersey.

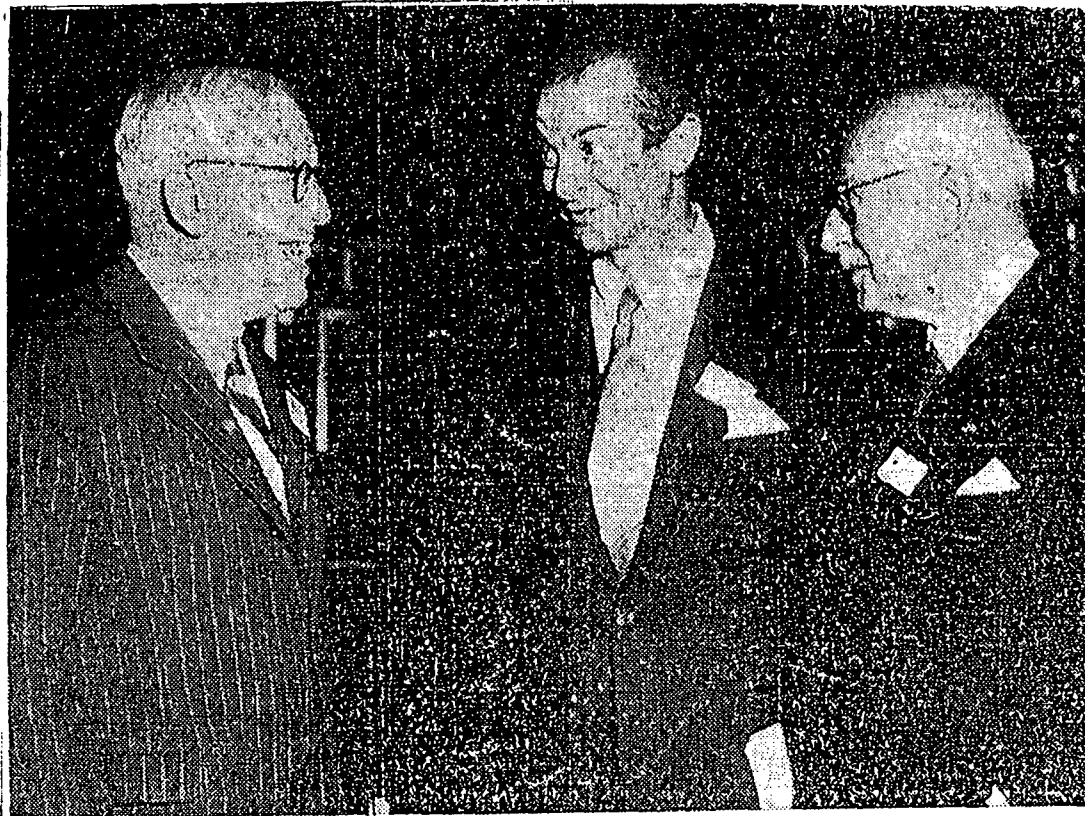
ATLANTIC CITY Daily World

VOL. 15. No. 123

ATLANTIC CITY, N. J., WEDNESDAY, SEPT. 21, 1949



WHEN SCIENTISTS GET TOGETHER



The myriad of interesting discoveries in the fields of chemistry and science was the subject of discussion between these well known scientists among the thousands in attendance at the 116th national meeting of the American Chemical Society here. Pictured above are (left) Glenn T. Seaborg and Kenneth Pitzer, atomic research men, while below are, left to right, Arthur B. Lamb, winner of the Priestley Medal who is now retiring after 30 years as editor of the Journal of the Society; Linus Pauling, of the California Institute of Technology and president of the society, and Marston T. Bogart, of Columbia University, former president of the International Union of Chemistry and former president of the society. (Staff Photos)

JC Credited for New Elements

S. F. CHRONICLE 9/23/49
MILTON SILVERMAN
Science Writer, The Chronicle
ATLANTIC CITY, Sept. 22 —
Creation of five new elements in the

University of California's cyclotron laboratories has been finally recognized by international agreement. The elements, all made by atom bombardment, are technetium, astatine, neptunium, plutonium and curium.

In addition, the scientists have agreed that tungsten isn't tungsten any more. Its new name is wolfram.

This was announced here today before the American Chemical Society by Dr. Alexander Silverman, head of the chemistry department at the University of Pittsburgh and American representative to the CPTL International Union of Chemistry.

Agreement on the new names was reached at a meeting of the international body held earlier this month at Amsterdam. Thirty countries, including Russia and five of her satellite nations were represented.

NAMING PROTOCOL

The decision supports the cherished right of a chemist to name an element if it discovers it first. It

also ends many years of wrangling over who discovered what.

The ruling which changes the name of the tough metal, element 74, from tungsten to wolfram was expected by many chemists. The metal, used in electric light filaments and in cutting and drilling tools, has been known as wolfram in most countries. The name comes from wolframite, the ore in which it was first discovered.

Dr. Silverman also disclosed that many of the long-accepted names of older chemicals were in danger of modification.

Many classically-minded scientists, he said, would like to change gold to "aurum," silver to "argentium," sodium to "natrium" and potassium to "kalium."

This would undoubtedly bring joy to the hearts of Greek and Latin scholars, and to workers in some European countries where these old names are still in vogue. In this country and England, however, such a change would cause a considerable amount of confusion.

"Nevertheless" he said "there is a possibility that some of these alterations will go through."

CREDITS GIVEN

Credit for the new man-made elements went as follows:

Element 43, technetium — Dr. Emilio Segre, now at UC, and the late Dr. Charles Perrier.

They discovered it in Palermo, Italy, in a sample of material sent to them in 1937 from the UC cyclotron laboratory. Its current price is about \$15,000,000 an ounce.

Element 61, promethium — Drs. J. A. Marinsky and L. E. Glendenin, Massachusetts Institute of Technology.

Made originally from the fission of uranium, it was discovered in 1945. Its current price is estimated to be about \$1,800,000,000 an ounce.

Element 85, astatine — Drs. Emilio Segre, D. R. Corson and K. R. MacKenzie, University of California in 1940.

Element 87, francium — Dr. Mar-

guerite Perey, Curie Institute, Paris, in 1939.

Element 93, neptunium — Drs. Edwin McMillan and P. H. Abelson, University of California in 1940.

Element 94, plutonium — Drs. Glenn Seaborg, Edwin McMillan, J. W. Kennedy and A. C. Wahl, University of California in 1940.

Element 95, americium — Drs. Glenn Seaborg, R. A. James, and L. O. Morgan, University of Chicago in 1944.

Element 96, curium — Drs. Glenn Seaborg, R. A. James and Arturo Ghiorso in 1944, discovered in material created at the University of California and analyzed at the University of Chicago.

Dr. Silverman reported the International Congress also changed the official name of element 4 from glucinium to beryllium, the term already used in this country. Element 41, known here as columbium, will be called by its European title, niobium. Element 71 will be known as lutetium, 72 as hafnium, and 91 as protactinium.

CHEMISTRY REPORTS TO THE NATION

Partial view of panel members appearing on the broadcast. (Left to right) Dr. Glenn T. Seaborg, Dr. Charles Allen Thomas, Dr. Glen King, Mr. Lea S. Hitchner, and Mr. Sam Serota.



NAC Represented at American Chemical Society Meeting

"Today we have the largest selection of agricultural chemicals for the control of pests in history," Lea S. Hitchner, Executive Secretary of the National Agricultural Chemicals Association, told members of the American Chemical Society during the general session of the 116th National ACS Meeting held in Atlantic City. Mr. Hitchner then cited examples showing how agricultural chemicals have increased the efficiency of agricultural production and added to the farmer's income.

"In Ventura County, California, control of wireworm on the lima bean crop added 7½ million dollars income to growers last year.

"Only in recent months has it been known that wireworms reduce sugar cane production in some areas by nearly half. It is now possible to double the yield of sugar cane in those areas by controlling this one insect.

"Control of insects on and around dairy cattle has resulted in an increased milk production of from 15 to 20 per cent. Treatment of beef cattle for insect pests resulted in an increase of 50 pounds extra weight per head of beef animals treated. It has been estimated that the extra beef and milk produced is worth 54 million dollars per year.

"World insect losses for stored grain total 6 million bushels a year. The development of new chemical methods for determining weevil infestation and increased application of chemicals is rapidly reducing these staggering losses. This year 2700 acres of grass land were treated as a part of the grasshopper control program. Reliable estimates show that this program resulted in saving half the grass grown on the treated

land. That grass could produce 11 million pounds of beef on the hoof. This treatment furthermore protected the land cover, preventing severe damage which would have taken years to heal.

"The production of Angou pears through the use of a fungicide has been increased three hundred thousand bushels a year. Grain yields in many areas have been increased from 25 to 100 percent through the use of weed control chemicals.

"Corn yields have been increased from 200 to 300 pounds of green ear corn per acre through control of the corn borer and corn earworm," he said.

Mr. Hitchner also appeared as a panel member of a Mutual Network broadcast titled "Chemistry Reports to the Nation" which was recorded during the ACS meeting and broadcast over Mutual Sunday, September 25 at 12:00 noon EST.

Other panel members were: Dr. Agnes Fay Morgan, University of California, 1949 winner of the Garvan Medal honoring women in chemistry; Dr. Glenn T. Seaborg, University of California, co-discoverer of plutonium and a member of the General Advisory Commission of the A. E. C.; Miss Florence Wall, New York, consulting chemist and one of the world's leading authorities on the chemistry of cosmetics; Dr. Charles Allen Thomas, Executive Vice-President of the Monsanto Chemical Company and a former President of the American Chemical Society; and Dr. Glenn King, director of the Nutrition Foundation, New York. Sam Serota, director of education for Station WIP, Philadelphia, acted as moderator.

Berkeley Gazette Swedes Invite 10/14/49 UC Scientist

Dr. Glenn T. Seaborg, noted University of California nuclear chemist, today has been extended a special invitation to attend Sweden's elite scientific meeting later this month and to lecture in a number of that nation's universities and research institutions.

The invitation to lecture and to attend the meeting of the Swedish Royal Academy of Sciences was extended through Professor Manne Siegbahn, a distinguished Swedish physicist and Nobel Laureate.

Dr. Seaborg will leave by plane for Sweden on Tuesday and return to this country in about three or four weeks. He will lecture on the trans-uranium elements and the high energy nuclear reactions which he has been studying recently.

The scientist is one of the co-discoverers of plutonium and element 95, americium, and element 96, curium. He is also responsible for significant recent advances in man's understanding of the fundamentals of radioactivity.

OAKLAND TRIB.

10/14/49

Seaborg Invited To Swedish Academy

BERKELEY, Oct. 14.—Dr. Glenn F. Seaborg, world-famous University of California nuclear chemist, has been invited to attend and lecture at a meeting of the Swedish Royal Academy of Sciences later this month, it was announced today. The Royal Academy, Sweden's elite scientific body, will hear the noted University scientist lecture on trans-uranium elements and high energy nuclear reactions. He will leave here by plane on Tuesday and return in three or four weeks, the announcement stated. Dr. Seaborg is one of the co-discoverers of plutonium which was so vital to the successful development of the atom bomb. He is also responsible for significant advances in man's understanding of the fundamentals of radioactivity.

NEW ISOTOPES—

Dr. Glenn T. Seaborg, co-discoverer of plutonium, americium and curium (elements 94, 95 and 96), reported at the meeting of the National Academy of Sciences that the creation of twenty new artificially radioactive isotopes in the region of the heavy elements by the giant University of California cyclotron has brought scientists a new understanding of the patterns of radioactivity. For example, it has been found that, in all the elements, from bismuth to curium, the energy of alpha particles ejected by radioactive atoms becomes progressively greater, in a given element, with decreasing weight of the isotopes. From these studies, Dr. Seaborg pointed out, it is also possible to learn more about conditions prevailing when the earth was "born" about two billion years ago. Presumably all of the new isotopes occurred in natural form at the birth of the earth, and became extinct as their radioactivity decayed.

NEW YORK N. Y. TIMES

NOV 28 1948

Bergslagsposten

Tidning för Lindes och Nora Bergslager samt Kopparberg, Grängesberg och södra Dalarna

31 oktober 1949

57:de årgången - Lösnummer 2

Känd atomforskare på besök hos släktingar i Grängesberg,

Hällefors och Kopparberg

Grängesberg hade ett ganska celebret besök på söndagen; den berömda och namnkunniga atomforskaren vid Berklevuniversitetet i Kalifornien Glenn T. Seaborg. Men det var inget officiellt besök, utan uteslutande tillkommet för att se moderns fädernehem Grängesberg, Lisselmågstorpet 1, där modern växt upp, samt besöka släktingar, en morbror, Verner Adolfsson i Majens, samt andra släktingar och släkt med släkten. Att gruvförvaltningen och dess chef W. Fredenberg också tog hand om mr Seaborg, visade honom samhället och inbjöd honom att bo på Tjänstemannamässen var en hövlighetsbetygelse, som mr

Mr Seaborg skulle ha kommit till Grängesberg redan på lördagen, men blev försenad på grund av besök i Hällefors — faderns hembygd, — där Helleforsbolaget också visade honom stor vänlighet, ävensom vid besök hos släktingar i Kopparberg, där han har en annan morbror, Karl Adolfsson, som är anställd vid järnvägsverkstaden och som jämte sin fru var med mr Seaborg hit till Grängesberg. Mr Seaborgs föräldrar, Teodor och Selma Seaborg, gjorde besök i Hällefors, Kopparberg och Grängesberg under förra sommaren.

Mr Glenn T. Seaborg, som är endast 33 år, samt lång och mörklagd, var under kriget en av USA:s främsta atomforskare och kan ta äran åt sig att ha upptäckt plutonium. Han talar och förstår svenska ganska bra. Nu har han varit i Sverige omkring en vecka och var bland annat en av hedersgästerna vid IVAS (Ingen-

jörsvetenskapsakademiens) årshögtid i måndags i Stockholm. Han har föreläst eller kommer att föreläsa i Stockholm, Uppsala, Lund och Göteborg. Hälften av sverigevistelsen är nu gången och från sitt grängesbergsbesök reste han idag på morgonen närmast till Göteborg.

Hans vetenskapliga gebit är kärnkemin. Efter plutoniums upptäckt strävar den unge mannen energiskt vidare och studerar just nu de övriga s. k. transuranerna, d. v. s. nyupptäckta grundämnen, tyngre än uran. Detta arbete är betydelsefullt, då det bl. a. klarlägger atomkärnornas byggnad.

När vår grängesbergsred. på söndagen lyckades få ett samtal med prof. Seaborg berättade han med största tillmötesgående om sin sverigevistelse och besöket hos släktingarna, såväl på moderns som på faderns sida. Han medförde från sin Sverigevistelse de allra bästa intryck.

Sverige var ett "gott" land och mötet med släktingarna här hemma hade givetvis glatt honom alldeles särskilt. Ifråga om atomforskningen och de märkliga resultat till vilka man redan kommit och fortfarande kommer vilke han livligt tro och hoppas att denna forskning i framtiden skulle få en alltmera fredlig inriktning och alltså komma mänskligheten till godo, inte i krigets utan i fredens och uppbyggnadsarbetets tjänst.

Arbetet vid Berklevuniversitetet, som förefaller vara ett speciellt hemvist för de flesta atomforskare, väntas inom fem år ge ännu mer fascinerande resultat, då världens största cirkotron på sex miljoner volt blir klar. Hitills har man arbetat med den i och för sig imponerande spänningen av 350 milj. volt, meddelade Seaborg.

Han var mycket förtjust över detta sitt första sverigebesök och hade också många erkännansamma ord att säga om gruvsamhället Grängesberg och den moderna industriella utvecklingen där.

Vätt vatten och fallskärmar på IVA:s högtidssammankomst

Tre nya guldmedaljer utdelade

Med professor Edy Velander som en veritabel trolleriprofessor på podiet, där han med ett vätningsmedel "gjorde vatten vätt" och slängde ut fallskärmar av glasdum eller okrossbara flaskor av polyten över församlingen, medan han i ett tre kvarts timmes fänglande anförande redogjorde för det senaste årets framsteg inom den tekniska forskningen och dess framtidsproblem, höll Ingenjörsvetenskapsakademien på måndagen sin 30:e högtidssammankomst i Illa Konserthussalen.

Av denna summariska sammankomst fattning av prof. Velanders årsrapport kunde man bibringga uppfattningen att den högtidliga sammankomsten varit närmast spektakel. Så var ingalunda fallet. Glans åt den gavs genom närvaro av statsministern, general Jung och andra representanter för det offentliga Sverige, akademisk festivitas genom bortåt 400 högtidklädda och ordensprydda ägare till de bästa hjärnor Sverige äger inom det tekniska och matematiska fältet, akademisk stramhet genom två klara vaxljus på presidebordet och enkelheten kring överlämnandet av akademiens guldmedaljer.

Högtidligheten inleddes punktligt med att akademiens preses bruksdisponent K. F. Göransson höll ett hälsningsanförande, i vilket han också gav en återblick på akademiens 30-åriga verksamhet och tillkännagav att arbetena på den nya forskningsstationen vid Drottning Kristinas väg nu tagit sin början. Han uttalade också förhoppningen om starkare stöd från statsmakterna. F. preses fil. dr. Sigurd Nauckhoff parenterade över under året avlidna ledamöter och generaldirektör N. G. Rosén redogjorde för Statens tekniska forskningsråd och dess verksamhet.

Under sin sexåriga tillvaro har rådet utdelat över 5 milj. kr. i statsbidrag till teknisk forskning, meddelade talaren, som mot slutet av sitt anförande starkt kritiserade det faktum att Sverige just på detta område börjat betydligt sätta efter andra länder. En successiv höjning av anslagen till tekniskvetenskaplig forskning framstår som ofrånkomlig.

Atomklyvning och djupfryst apelsinsaft

Prof. Velanders rapport till akademien i hans egenskap av dess verkställande direktör tilldrog sig utan tvivel det starkaste intresset. Bland personer som knutits till

mlhjul. En flaska kan samtidigt användas för fräschissör. Användningen av vätningsmedel eller det tationer arbetet för rarna. Ett nytt dramamin, är 100-procentigt. En ny elektrometod har upptäckts som används för att få bilder på ett

Detta var som så axplock ur en fascinerande föreläsning var lärt men roligt. När talaren demonstrerade ett föremål av seigné hans handskar — den så känslig för temperaturer att den skulle ha han berört den med bli

Tre personer tilldelades guldmedalj. De ingenjör Salomon K för hans insatser på dess område, professor Luthman för hans skildring och fil. lic. Gotthard för hans framstående konstruktioner.

Överlämnades av statspresens gemensam middag i G-våning med ca 250 deltagare. Ses hälsade därvid välkomna föredragshållare och generer talade vice preses rapport. Professor R. Woxén, och tack framfördes av statspresens Erlander.

akademien är tre amerikaner av svensk härkomst, nämligen Dean R. Gustavson, Nebraskauniversitetet, Gunnar Nicholson, New York, och dr Glen Seaborg, Californiauniversitetet, som just nu gästas akademien.

Att här redogöra för alla de tekniska sensationer som prof. Velander berörde skulle föra för långt. Många har också redan varit föremål för redogörelser i olika sammanhang. Hans föredrag omspände praktiskt taget alla vetenskapens fält från atomklyvning till djupfryst dehydrerad apelsinsaft. Ett axplock bör inte endast intressera den tekniskt kunnige. Vid Los Alamos-laboratoriet har man nyss tagit i bruk en forskningsreaktor, vilken fungerar ungefär som "en till måttlig reaktionshastighet reglerad atombomb" — en beskrivning som måhända tillfredsställer specialisterna! En kolisotop alstras i den högre atmosfären genom att kväveatomer råkar ut för kosmisk strålning. Reaktionsdriftens överlägsenhet i hastighet har satts i fråga. I USA bygger man nu tåg där varje vagn endast har två hjul, och i Frankrike har de gum-

inte på bomb av kvicksilver

— Atomforskningen får en alltmer fredlig inriktning, berättar den amerikanske atomforskaren Glenn T. Seaborg för Stockholms-Tidningen. Amerikanerna räknar med att om tio år ha byggt ett atomkraftverk, som ger 100,000 kilowatt, d. v. s. som ett medelstort svenskt kraftverk.

De s. k. spåratomerna har fått stor användning inom industrin för olika kontrollmätningar. Just de anordningar, som används för framställning av plutonium, ger värdefulla radioaktiva biprodukter, som även mycket nyttjas inom medicinen. De är bl. a. billig ersättning för radium.

Mr Seaborg var under kriget en av USA:s främsta atomforskare och kan ta äran åt sig att ha upptäckt plutonium. Hans föräldrar var svenskar och han talar och förstår svenska fullt hjälpligt. På lördag skulle det förresten bära av upp till Grängesberg, där hans mor föddes.

Seaborgs vetenskapliga gebit är kärnkemin. Efter plutoniums upptäckt strävar han energiskt vidare och studerar just nu de övriga s. k. transuranerna, d. v. s. nyupptäckta grundämnen, tyngre än uran. Detta arbete är betydelsefullt, då det bl. a. klarlägger atomkärnornas byggnad.

Mr Seaborgs arbete vid Berkley-universitetet i Kalifornien — varifrån f. ö. de flesta atomforskarna tycks komma — väntas inom fem år ge ännu mera fascinerande resultat, då världens största cyklotron på sex miljarder volt blir klar. Hittills har man arbetat med den i och för sig imponerande spänningen på 350 milj. volt.

Påståendena att kvicksilver skulle kunna användas till atombomber tar han med upphöjt lugn:

— Det är säkert en anka!

Mr Seaborg stannar i Sverige 14 dagar och föreläser bl. a. i Stockholm, Uppsala, Göteborg och Lund. På torsdag talar han på Stockholms högskola om kärnkemin.



På lördag åker jag upp till Grängesberg och tittar på mors födelseort, säger atomforskaren
GLENN T. SEABORG.



• Statsminister Tage Erlander blev stormförtjust i nylonstrumporna i går kväll vid IVA-kongressen. Här känner han på "underverket" tillsammans med amerikanske atomforskaren Glen Seaborg.

EXPRESSEN 10/25/49
**Nylonstrumpa av kort fiber
 på varje herrfot är målet**

Nylonstrumpor för herrar var en av de mest omtalade sensationerna på Ingenjörsvetenskapsakademiens trettonde högtidssammankomst i går. Frackklädda herrar nöj i de svåråtkomliga finesserna som realisationshyenor i eftertraktade stuvbitar, och de som redan uppträdde med nylonklädda fötter sjöng strumpornas lov i alla tonarter.

Men herrarnas nylonstrumpor är in så länge en uteslutande amerikansk företeelse. Mr Seaborg från Amerika — med atomforskning som specialitet — skulle aldrig klarat de svenska tvättproblemen om han inte fyllt sin kappsäck med nylon, och professor Edy Velandar tvättar med förtjusning nylonstrumpor varannan kväll sedan månader tillbaka utan att ha behövt stoppa ett enda litet nål. Priset är överkomligt — 1 dollar pr par. Men i Sverige finns de inte till salu.

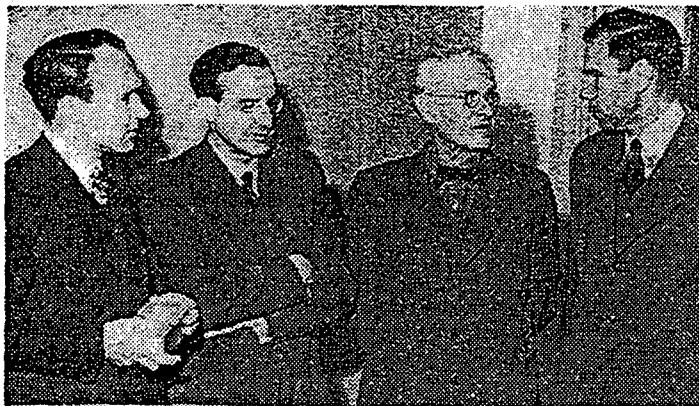
— Herrstrumpan är helt annorlunda än damstrumpan, berättar professorn vid ett samtal med Expressen. Den är gjord av en kortfiber, som spunnits som ull, har en krusig

yta och ger en ullig och mjuk känsla. Efter att ha tvättats några gånger luddar den sig något, men hållbarheten är hittills utom all konkurrens. Det nya orlonet lär vara ännu bättre, men det har väl knappast uppträtt i strumpform på världsmarknaden ännu.

I synnerhet för resenärer är nylon-skjortan kanske lika betydande som strumpan. Man tvättar upp den i hotellets handfat på kvällen och tar den på sig ostruken men otadlig följande morgon. Europeer som kommer över till Amerika brukar med förtjusning realisera hemmaskjortorna för att kunna fylla sina kappsäckar med nylon. Numera sys skjortorna också i lättare material vävt i kvadrater med varannan ruta i en ventilläknande tunnare vävnad.

Så särdeles länge skall det väl inte dröja förrän vi får svenska nylonkläder i herrgarderoben. Nylonrep till fisklinor kommer i marknaden på nyåret. Och sen skall det väl inte behöva ta så lång tid förrän den övriga nylonproduktionen kommer i gång.

Plutoniums upptäckare på Chalmers.



Fr. v. docent Karl-Erik Zimen, professorerna Nils Ryde, Arvid Hedvall och Glenn Seaborg.

Chalmers och Tekniska samsamfundet hade en förnämlig gäst i talarstolen i går kväll uppe i nya hörsalen för fysik på Chalmers. Där höll en av USA:s främsta kärnkemister, professor Glenn Seaborg föredrag. Han kallade det »Nuclear energy and the transuranium elements» och för ett sakkunnigt auditorium berättade han om teknisk och industriell tillämpning av atomenergin och om de grundämnen som man upptäckt under de intensiva och omfattande uranforskningarna.

Professor Seaborg är omkring 40 år och han har svenskt påbrå. När han i går kom till

Göteborg hade han bl. a. varit och hälsat på släktingar i Dalarna. Annars hade han tillbragt den mesta tiden i den av professor M. Siegbahn ledda institutionen i Stockholm. I Göteborg togs han om hand av docent Zimen, som under sin amerikavistelse för något år sedan en månads tid studerade vid professor Seaborgs laboratorium i Bearkly, Californien. Professor Seaborg är mest känd som upptäckare av plutonium. I dag tittar han på docent Zimens kärnkemiska institution och på professor Rydes kärnfysikaliska institution. Sedan far han till Lund och Stockholm, varifrån det blir flyg tillbaka till USA. Hans sverigebesök blir två veckor.

Upptäckaren av plutonium tror på ny era för industrin

Vetenskapsmannen professor Glenn T. Seaborg, USA, vilken varit medarbetare till nobelpristagaren Lawrence vid Berkeleyuniversitetet i Californien och som upptäckt grundämnet plutonium, gästade på fredagen och lördagen Kopparberg, där han har en morbroder, Karl Adolfsson i Herrhagen, genom vars förmedling Örebro-Kurirens medarbetare fick en intervju med den celebre gästen.

Vi slår oss ned i kretsen av den adolfssonska familjen, vars alla medlemmar tillsammans med professor Seaborg är samlade hos fru Karin Adolfsson-Möller, och får en mycket angenäm samtalsstund med den numera världsberömda vetenskapsmannen, vilken som Kungliga svenska vetenskapsakademins gäst besöker vårt land för en föreläsningsturné om atomkraftens förutsättningar inom vetenskap och industri.

Professor Seaborg är ett mycket förekommande intervjuobjekt, som välvilligt hjälper den enkle reportern tillräkta med en del anteckningar, och dessemellan talar om sina intryck av vårt land, vilket han gästar för första gången. Han berättar att hans farfar föddes invid Hällefors och utvandrade till Amerika 1867, att alltså fadern var född där ute i västern, att modern växt upp i Grängesberg. På fredagen besökte han sin faders hem i Hällefors, och på inbjudan av Hälleforsverkens chef besökte han järnverkens anläggningar med ing. Paues som ciceron och på söndagen besökte prof. Seaborg Grängesberg på inbjudan av disp. Fredenberg, för att bese dessa världsberömda gruvor. Besöket i Grängesberg blev alldeles särskilt kärt därför att professor Seaborg då fick tillfälle gå in under det tak där modern växt

upp, och se den omgivning där hon lekt som barn.

Tre föreläsningar har avverkats i Stockholm, på vetenskapsakademien, på Nobelinstitutet och vid Stockholms högskola. På måndagen skall professorn föreläsa vid Göteborgs högskola om sitt arbete inom atomforskningen, vid Lunds universitet på onsdagen och sedan en föreläsning i Uppsala. Färden går, sedan över England, där någon föreläsning skall hållas, samt vidare åter till USA.

Naturligt är att vi passar på att fråga om hur framtiden kommer att utgestaltas genom de revolutionära upptäckter som gjorts inom atomforskningen. Där vill professor Seaborg endast tala om dess fredliga uppgifter, och påvisar att upptäckten av grundämnet plutonium, vilket uppstår vid beskjutning av uran med neutroner som finns i naturen, i pechblände, ger en biprodukt radioaktiva ämnen för fredligt bruk, och användes inom medicinen, inom biologisk forskning och inom industrin. Att vi kan vänta mycket av denna forskning är alldeles säkert, och man kan med säkerhet förutsäga att man om 10 år kan börja att mera praktiskt dra nytta av våra redan nu vunna resultat och av den fortsatta verksamheten på atomforskningens område, säger professorn. Han nämner något om den jättecyklotron som nu bygges i Berkeley, vil-



Professor och fru
Glenn T. Seaborg

ken får en energi av 6 miljarder elektronvolt. Som en jämförelse nämner han, att den nuvarande cyklotronen, vilken "endast" håller 400 miljoner elektronvolt dock är tio gånger starkare än någon tidigare byggd atomkanon.

Prof. Seaborg säger sig hoppas att världen trots alla olycksbådande moln, ändock må gå en lycklig atomålder till mötes, vilket professor Seaborg innerligt hoppas.

Han uttalar till sist sin glädje över att fått besöka sina släktingar, sina faders bygder, vilka han finner vackra i sin för närvarande vita vinterskrud, och sin uppskattning av att fått träffa svenska kolleger, vilkas namn är högt aktade i universellt vetenskapligt arbete.

På en fråga omtalar professor Seaborg att det finns 22,000 studerande vid Californiauniversitetet, en imponerande siffra.

Gegewe.

Upsala Nya Tidning



Den amerikanske kärnkemisten, prof. Glen T. Seaborg (t. h.) tillsammans med prof. The Svedberg före föredraget på kemiska institutionen.

Syntetiska grundämnen framställs i vägbar mängd

Genom att studera strukturen hos de nyupptäckta grundämnena 95 och 96 — americium och curium — kan man framför allt lära mycket om strukturen hos redan kända grundämnen. Däri ligger tills vidare nyttan av de båda här nämnda syntetiskt framställda 95 och 96, sade den amerikanske atomforskaren prof. Glen T. Seaborg, Berkeley, vid ett föredrag på kemiska institutionen i går. Prof. Seaborg har med sina medarbetare för första gången lyckats framställa syntetiska grundämnen i vägbar mängd — det rörde sig till en början om endast ett miljon-dels gram, men i varje fall beträffande plutonium har man nu nått så långt, att det kan framställas kilovis.

Tal. berörde i föredraget, som bar titeln "The chemistry of the transuranium elements", sina försök i helmikroskala och beskrev vidare den experimentella metodiken vid framställningen av de nya grundämnen och de omfattande åtgärder, som man i samband därmed måste vidta för att skydda sig för den radioaktiva strålningen. Han konstaterade också att de nya grundämnena fyller ut en del luckor i det periodiska systemet.

Prof. Seaborg — som har svenskt påbrå — är en av Amerikas förnämsta atomforskare, och han strävar nu vidare på att studera de s. k. transuranerna, nyupptäckta grundämnen, vilka är tyngre än uran. Om c:a fem år blir en ny jättecyklotron på sex miljarder volt klar vid det universitet, där prof. Seaborg arbetar, och därmed har man fått betydligt större förutsättningar att komma fram till nya, sensationella resultat inom kärnkemin. Atomkraft-

teus utnyttjande industriellt räknar den amerikanske atomforskaren med inom tio år, då USA torde kunna ha förverkligat ett "atomkraftverk" på 100,000 kW.

Föredraget i Upsala ingår i en rad föreläsningar, som prof. Seaborg skall hålla i Sverige. Udit

Exc. Erlander roades av slitstarka strumpor vid IVA:s högtidsmöte

LUNDS DAGBLAD 11/1/49
Glenn T. Seaborg
 gästföreläser
 i Lund

Kemiska föreningen har tillsammans med Fysiska föreningen inbjudit professor Glenn T. Seaborg, Berkeley, USA, att föreläsa i Kemiska institutionens stora sal i morgon kl. 19,15. Hans föredrag bär titeln "The Chemistry of the heaviest elements".

Professor Seaborg är trots sin ungdom en av den moderna kärnkemiens mest framstående forskare. Som redan namnet anger, är han svenskättling. Hans förfäder utvandrade från Dalarna. Själv är han född i Ishpeming, Mich. USA, 1912, blev phil. dr. 1937, 1945 professor i kemi vid the University of California, Berkeley. Under det sista världskriget var han för uranforskning engagerad vid the Metallurgical Laboratory i Chicago.

Särskilt har han ägnat sin uppmärksamhet åt de s. k.

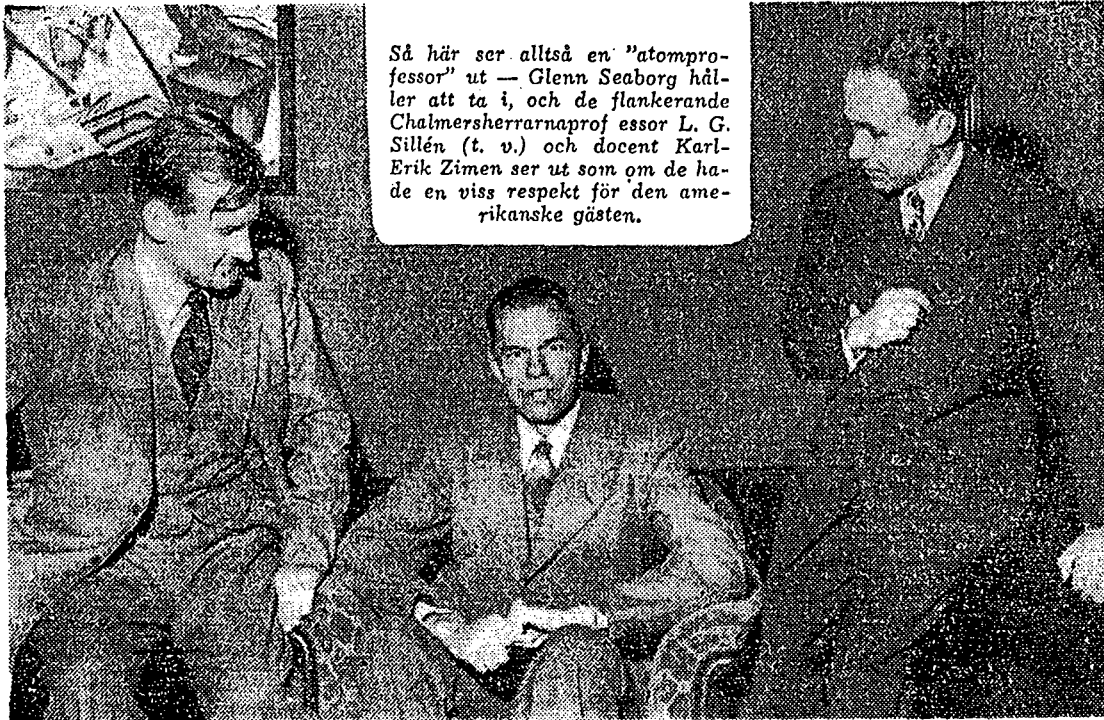
transuranerna, d. v. s. åt de fyra element neptunium, plutonium, americ och curium, som ha högre ordningsnummer än uran med nr 92 i periodiska systemet.



Den förtjusta minen hos herrarna på bilden ovan är betingad av de strumpor de just demonstrerar för varandra. Demonstrationen ägde rum vid Ingenjörsvetenskapsakademiens trettionde högtidssammankomst i lilla Konserthussalen på måndagen, och strumporna är herrnylon, tillverkade av stapelfibrer, vilket gör strumporna både slitstarka och lättvättade. Her-

rarna är fr. v. akademiens preses, bruksdisponent K. F. Göransson, statsminister Tage Erlander och den amerikanske atomforskaren Glen Seaborg, och i bakgrunden skymtar professor emeritus Henrik Kreüger och f. generaldirektören Anders Örne. Tre guldmedaljer utdelades och kvällen slöt med middag på Grand. Sammankomsten refereras på sidan 13.

Atomprofessor från USA tvivlar ej på ryssbomben



Så här ser alltså en "atomprofessor" ut — Glenn Seaborg håller att ta i, och de flankerande Chalmersherrarnaprofessor L. G. Sillén (t. v.) och docent Karl-Erik Zimen ser ut som om de hade en viss respekt för den amerikanske gästen.

— Tror ni att ryssarna kan tillverka en verklig atom-bomb?

Den amerikanske kärnkemisten professor Glenn Seaborg tycktes liksom tveka ett slag, och han verkade så sammanbiten att intervjuaren

knappast hoppades på ett direkt svar. Han såg sannerligen ut för att kunna bevara atombombhemligheten effektivt — åtminstone den rent vetenskapliga sidan torde han helt behärska — och att söka pressa honom på något, som han inte ville tala om, skulle

nog inte falla någon in i första taget.

Prof. Seaborg är ett av de där stuvuxna exemplaren från staterna, vilka icke sällan har svenskt påbrå, och så är förresten förhållandet i det här fallet. Vi säger väl att resligheten är svenskt arv, när det nu inte går

att häkta på epitetet "blond nordisk jätte" och eftersom hakan, som han inte rör på i onödan, har otvetydigt amerikanskt snitt. Vi hade nått och jämt hunnit göra dessa reflexioner, då svaret kom — klart och koncist:

— Ja, det tror jag.

Och ett lika klart svar lämnade den stuvuxne professorn på HT-medarbetarens fråga om huruvida han och hans amerikanska kolleger blivit mycket överraskade, då nyheten om att ryssarna skulle ha företagit ett verkligt bombexperiment, kablades ut över världen.

— Inte särskilt, säger prof. Seaborg.

— Tror ni då att ryssarna haft mycket stor nytta på detta område av de tyska vetenskapsmän, som de lade beslag på under kriget?

— Ni menar att denna hjälp skulle ha varit av avgörande betydelse? I så fall svarar jag nej.

— Ryssarna skulle alltså vara kapabla att själva lösa atombombsproblemet?

— Det tror jag.

Professor L. G. Sillén och docent Karl-Erik Zimen vid Chalmers tekniska högskola, som tog hand om den namnkunnige amerikanske kärnkemisten vid hans ankomst till Göteborg nickar instämmande: de har tydligen samma mening om den här saken. I sammanhanget kan förresten nämnas att docent Zimen tidigare varit över hos prof. Seaborg, så här var alltså återseendets glädje. Det var nog heller inte bara en artighet, när prof. Seaborg försäkrade att,

det var en länge närd önskan han fått uppfyllt, när han nu fått komma över till Sverige. Hans mor är född i Bergslagen, och professorn har just varit där uppe och hälsat på släktingar. Och så vill han ge ett litet prov på sitt påbrå och säger en mening på nästan oklanderlig svenska. Han förklarar att en del av släktingarna inte kunde engelska, och då fick han försöka putsa upp den svenska, som han en gång behärskat bättre...

Prof. Seaborg har bl. a. upptäckt plutonium, och under kriget var han ansvarig för studiet av de kemiska egenskaperna hos transuranerna och i synnerhet då plutonium. Nu är han ledare för den kemiska gruppen forskare, som sysslar med jätte-cyklotronen vid University of California i Berkeley. På måndagskvällen föreläste han på Chalmers Fysikum över ämnet Nuclear energy and the transuranium elements. I dag tittar professorn lite närmare på institutionerna vid Chalmers, och sedan reser han vidare för att föreläsa i Uppsala och Lund.

AMERICAN PAPER AMERICA FIRST AMERICAN PEOPLE

San Francisco Examiner

Monarch of the Dailies

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▶CCCC** **

SAN FRANCISCO, SUNDAY, JANUARY 15, 1950

DAILY AND SUNDAY PER MONTH \$2.00 DAILY 7 CENTS, SUNDAY 10 CENTS

NEW ELEMENT DISCOVERED AT UC CYCLOTRON

Heaviest Known; Not for Use in Bombs; Found by Dr. Seaborg

A new element, the heaviest known to science, has been discovered in experiments at the University of California's cyclotron, *The Examiner* learned yesterday.

The new element, No. 97 in the atomic scale with a weight in the atomic scale above 242, probably will be named Berkelium in honor of the university's home town.

(The number of elements in the atomic scale is determined by the number of protons in the nuclei. The lightest element, hydrogen, is element No. 1, with one proton. Its weight is 1.0080.)

It was discovered by the brilliant young atomic scientist, Dr. Glenn T. Seaborg, 36 year old U. C. chemistry professor, who also is co-discoverer of the last three elements uncovered — Curium, No. 96, weight 242; Americium, No. 95, weight 241; and the most famous of the three, Plutonium, weight 239.

NOT FOR BOMBS—

The discoverer of an element has the privilege of naming it.

Doctor Seaborg last night refused to confirm or deny the newest element's existence, but said any such announcement would have to come "through channels." The work on atomic energy at U. C. is financed by the Atomic Energy Commission, which requires its approval before any such announcement can be made officially.

It is known, however, that the newest element, unlike Plutonium but like Curium and Americium, cannot be used in the making of atomic bombs, so is not expected to be classified by the Atomic Energy Commission as restricted matter.

MADE BY MAN—

Rumors that the new element, which does not occur in nature, had been discovered some months ago, were "totally unfounded at that time," Doctor Seaborg asserted last night. The element is created in the cyclotron through the bombardment of other elements.

Doctor Seaborg, one of the world's outstanding chemists, in 1947 was given one of the Nation's top chemistry awards, the \$1,000 Pure Chemistry Award for the best chemical research of that year by a man under 35 years of age.

He is a member of the nine man general advisory committee to the Atomic Energy Commission, has been elected to the National Academy of Sciences and has received numerous medals for his scientific achievements.

San Francisco Chronicle

THE CITY'S ONLY HOME-OWNED NEWSPAPER

FOUNDED 1865—VOL. CLXX, NO. 2 CCCCAAB SAN FRANCISCO, TUESDAY, JANUARY 17, 1950

UC Produces Another New Element

The University of California's cyclotrons have produced another new element, this one the heaviest known.

The new substance, No. 97 in the atomic scale, is the fifth to be produced by the cyclotron's atomic-particle bombardments.

Dr. Glenn T. Seaborg, 37-year-old professor of chemistry at the university, said it probably would be named Berkelium, in honor of the city of Berkeley. The element was discovered December 19 but its announcement withheld pending necessary approval by the Atomic Energy Commission.

(The Chronicle was in possession of the Element 97 story for some days, but because of security considerations elected to hold publication until official announcement yesterday by the University of California.)

NOT FOR WEAPONS

What the new element is like and what might be done with it were not announced, but Dr. Seaborg said theoretical considerations rule out its use in atomic weapons.

Investigations of its properties are continuing.

Dr. Seaborg named two research associates, Dr. Stanley G. Thompson, 37, and Albert Ghiorso, 35, as codiscoverers, with him, of the new element. Dr. Seaborg has been co-discoverer of four of the five new elements produced in the Berkeley cyclotrons: Plutonium, Americium, Curium, and now the tentatively-named Berkelium. (The fifth: Neptunium.)

ANCIENT DESIGNATION

"Elements" were so-named, by the ancients, because they were regarded as substances which were indivisible. Iron, chromium, copper, lead, oxygen and hydrogen are a few of the best-known elements. Today, science has discovered that elements are not indivisible elementary particles of matter at all, however; and that they can, in fact, be changed into other, entirely different substances.

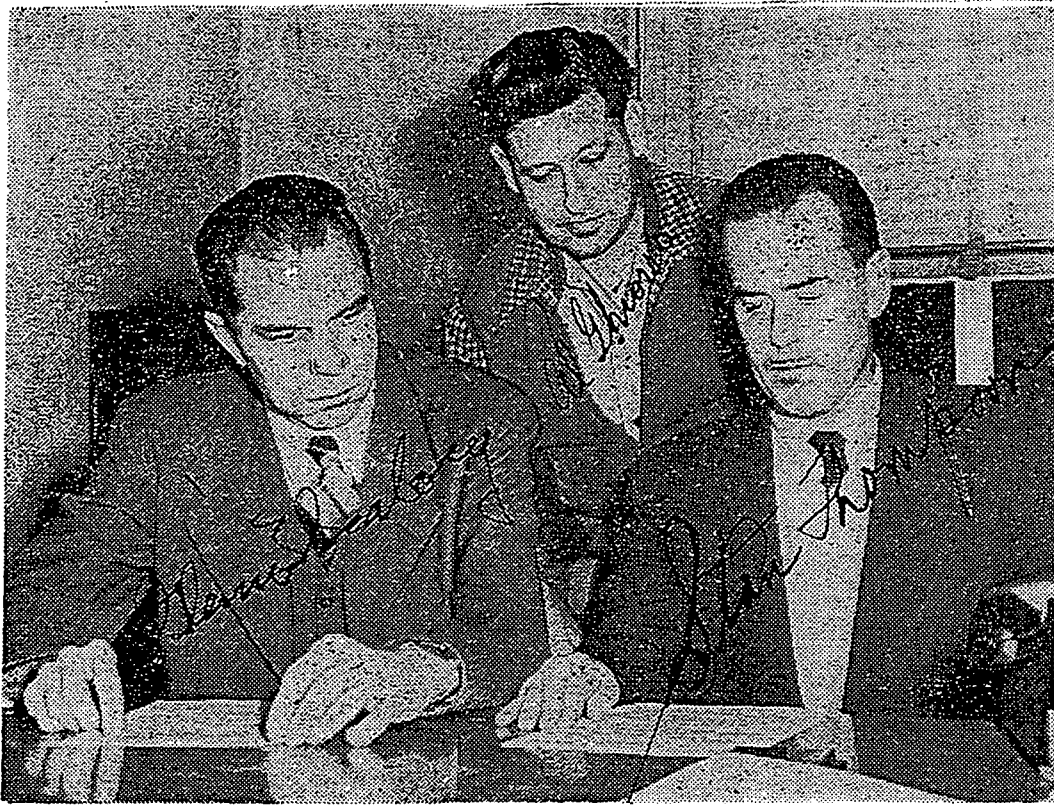
The University of California cyclotrons are machines which do this. These machines drive atomic particles (fractions of atoms) at speeds of thousands of miles per second; and atoms of one element, exposed to this terrific bombardment of particles, will be transmuted into different substances.

TOO RADIOACTIVE

One new element, Americium, was bombarded thus to produce Curium, for instance. Until Berkelium came along, Curium was the heaviest-known element. (Hydrogen is the lightest of the 97).

Curium and the other newly produced elements from cyclotrons probably all existed on earth millions of years ago, but were so radioactive they "broke down" or decayed into other elements long ago. When Curium was discovered here, it was announced as the most violently radioactive solid ever isolated. All such radioactive materials tend to decay to elements of lower atomic weight, and eventually into lead. So today, elements like Curium must be made in cyclotrons; they are not found in nature.

U.C. Scientist Discovers 'Berkelium,' Violently Radioactive New Element



Discussing the significance of the new element they discovered are these University of California scientists (left to right) Dr. Glenn T. Seaborg, Albert Ghiorso and Dr. Stanley G. Thompson. The new element has been named berkelium, after the City of Berkeley. Tiny fragments of the new substance have been produced on the U.C. cyclotron.—Tribune photo.

Number 97 Becomes Sixth Artificially Made by Cyclotron

BERKELEY, Jan. 17.—Discovery of a new, violently radioactive chemical element, tentatively named after the city of Berkeley, was announced late yesterday at the University of California.

Creation of the new element by world famous chemist Dr. Glenn T. Seaborg and two associates, brings a total of six made artificially by the university's cyclotron laboratories. Four of this total were co-discovered by Dr. Seaborg.

Announcement of the new element, known on the periodic table as 97 or popularly suggested as berkelium, (pronounced berk'-li-um) was made yesterday immediately after "declassification" by the government. Rumors of the discovery have been current for several months.

IDENTIFICATION MADE

Details concerning how the element was made and its properties are not available, but theoretical considerations rule out its use in production of atomic weapons, Dr. Seaborg emphasized.

Extremely tiny fragments of the new element, enough to be positively identified, according to the scientist, were made on the 60-inch cyclotron of the Crocker Radiation Laboratory on the Berkeley campus. Further investigations of its properties also were made by bombardments with the giant 184-inch cyclotron, Dr. Seaborg said.

Until 1940, artificially produced elements were not known. Before then, all the known elements were naturally produced, such as gold, oxygen, sodium, and iron. The total of these natural elements ended on the chemical periodic table with the number 92.

In that year, however, Drs. Edwin McMillan and P. H. Abelson of the university, bombarded uranium, a natural element, with neutrons and produced neptunium,

element 93.

During that same year, the periodic table grew again when Drs. Glenn Seaborg, McMillan, J. W. Kennedy and A. C. Wahl, all of the university, synthesized plutonium, element 94, which is now believed to be the chief explosive agent of the atomic bomb.

In 1944, another new element, 95, or americium, named after the United States, was produced by Drs. Seaborg, R. A. James, and L. O. Morgan, at the University of Chicago laboratories.

Following this in the same year, Drs. Seaborg, R. A. James and Arturo Ghiorso, discovered element 96 or curium, in materials created at the university here and analyzed at the University of Chicago.

YEARS OF WORK

Element 97, or berkelium, announced yesterday, was produced by Dr. Seaborg, Dr. Stanley G. Thompson and Mr. Albert Ghiorso, all of the University of California.

Dr. Seaborg related that this new discovery culminates four years work in which both the chemical and nuclear properties of heavy elements were investigated and systematized in the university's cyclotrons.

Dr. Seaborg, 36 years old, is one of the world's outstanding chemists. He is a member of the nine man general advisory committee to the Atomic Energy Commission and in 1947 was awarded the Pure Chemistry Prize, one of the Nation's top scientific rewards.

It's No. 97; UC Unveils New Element

University of California Radiation Laboratory scientists today have done it again—produced a new element, No. 97, in the atomic scale.

The new element is the heaviest one produced yet by the University's cyclotrons.

It also brought to 97 the total number of elements so far developed by scientists.

Credit for the new UC discovery went to Dr. Glenn T. Seaborg, professor of chemistry; Dr. Stanley G. Thompson and Albert Ghiorso, research associates.

The extremely small amounts of the new element were made on the 60-inch cyclotron. Prevailing information indicates the new discovery has 97 electrons whirling about its nucleus.

Pending official announcement from the Atomic Energy Commission, speculation only exists as to the new element's potential use.

Scientists, however, said "theoretical considerations" rule out the new isotope and its properties in the production of atomic weapons.

The new element, No. 97, has been tentatively named Berkelium, in honor of the city where it was discovered.

Development of the new element culminates four years of work in which the necessary background information of both the chemical and nuclear properties of the heavier elements were investigated and systematized.

HEAVIEST ELEMENT

No. 97 replaces curium, also discovered here, as the heaviest element known.

It is the fifth element discovered on UC cyclotrons—the others being neptunium, plutonium, americium and curium.

Prof. Seaborg has participated in all findings with the exception of neptunium.

He and other UC scientist synthesized plutonium with 94 electrons back in 1940.

Five years later the professor discovered elements No. 95 and 96 while he was working at the University of Chicago. The new discoveries were called americium after America and curium after the Curies.

And now No. 97.

1/22/50

The University of California's great cyclotrons had produced some strange transmutations by slamming atom particles against the atoms of known elements.

The atoms of such elements as iron, copper, oxygen and mercury had once been considered the basic and indivisible stuff of nature. But the cyclotrons had persisted in shattering this myth beyond repair. An atom of arsenic, for instance, could be transformed by atomic bombardment into an atom of cobalt. Berkeley scientists had even produced four elements (neptunium, plutonium, americium and curium) unknown on earth in their natural state.

Last week they announced the isolation of a radioactive fifth, whose atoms were the heaviest yet created artificially.* Co-discoverer

Dr. Glenn T. Seaborg, a 37-year-old professor of chemistry, announced that the new element, No. 97 in the atomic scale, would probably be called berkelium (pronounced berkeley-um) after its home.

*Elements with heavier atoms probably existed on earth millions of years ago, but they have broken down into such known elements as lead.

Birth of an Element

Good evidence has been obtained for the identification of an isotope of the new artificially made chemical element with the atomic number 97, bringing the total number of known elements to 97.

Thus cautiously the University of California last week announced the discovery of the largest atom yet made by man or nature.

The finding was credited to chemistry professor Glenn T. Seaborg and research associates Dr. Stanley G. Thompson and Albert Ghiorso. They suggested the name berkelium, after Berkeley, Calif., the site of their university.

Although the announcement gave no other important details, it was not hard for other scientists to arrive at some plausible conclusions about the element:

► It was made with the aid of the university's two giant cyclotrons. One of the lighter elements, probably americium or curium (numbers 95 and 96), was bombarded with atomic bullets, either protons, helium atoms, or neutrons.

► The new element is so violently radioactive that it has not and perhaps never will be isolated in pure form. The "evidence" referred to in the announcement is a peculiar type of radioactivity emanating from a complex mixture of radioactive material. The California scientists have probably been reasonably sure of their discovery for several months.

► Now that number 97 has been made, number 98 should be well on its way.

Seaborg has now taken a part in the discovery of four man-made elements. The other three were plutonium, which is used in atom bombs, americium, and curium. How many more he and his associates will be able to make is debatable.

As the numbers get higher, elements tend to disintegrate spontaneously by atomic fission before they can be identified. It is unlikely that any above number 94 (plutonium) will be stable enough to be useful for atomic power or weapons. And one theory holds that no element above atomic number 137 can even exist. The reason given is that the innermost electrons of its atoms would have to circulate faster than the speed of light, a possibility which modern physics will not admit.

Although Seaborg is only 37 years old, he is already regarded as one of the world's top scientists. Tall, lean, and somewhat stoop-shouldered, he is almost always surrounded by a coterie of admirers and advice seekers at scientific gatherings. Last year he proved that he had the versatility characteristic of all truly great scientists. With equal facility he presided at the birth of an element and an infant.

The child was his own. Realizing that there was no time to reach the hospital, he delivered the baby at home. After it was all over, he remembered with horror that he had forgotten a vital step in the procedure. So he bounded downstairs and into the kitchen, where he boiled up a large pot of water.

Medieval man knew of only four elements—earth, air, fire and water. By 1940, scientists knew of 92 elements—ranging from lightweight hydrogen, whose atom has only one electron, to heavy uranium, with 92 electrons. Many chemists thought that their long search for elements was ended, and then the University of California's powerful cyclotron got busy.

Atomic experts bombarded uranium with atomic particles from the cyclotron



CHEMIST SEABORG
Like previous bombardments.

and produced neptunium, a new "synthetic" element with 93 electrons. Next, Dr. Glenn T. Seaborg and co-workers discovered plutonium (No. 94), and, four years later, at the University of Chicago, americium (No. 95) and curium (No. 96). Last week tall, gaunt, 37-year-old Chemist Seaborg and his associates were in the news again. By bombarding americium with alpha particles, they had produced another new element, with 97 electrons.

The San Francisco *Examiner* got hold of the story and printed it, although such discoveries are on the Atomic Energy Commission's restricted list. But once the news of No. 97 was out, the University of California hastily conferred with AEC and issued a guarded statement. After "four years' work in which the necessary background information of both the chemical and nuclear properties of the heavy elements [were] investigated and systematized . . . extremely small amounts of the new element were made on the 60-inch cyclotron of the Crocker Radiation Laboratory . . . Details concerning how the new isotope was made and its properties are not available, but theoretical considerations rule out its use in production of atomic weapons."

Proposed name for No. 97: "berkelium" (pronounced berklium), in honor of Berkeley, the university's home town.

TAC-CITY HERALD
RICH., WASH.
Seaborg
2/28/50
Visitor

Dr. Glen T. Seaborg, member of the Atomic Energy commission general advisory committee for four years, is a visitor today at Hanford works.

He is making a two-day inspection of the works as part of his work on the committee. The nine-man committee was appointed by the president from civilian life to advise the AEC.

Dr. Seaborg is a professor of chemistry at the University of California.

He will address the Richland section of the American Chemical society tonight on "High Energy Nuclear Reactions" at 8 o'clock in the Jefferson school cafeteria.

Dr. Seaborg has received many honors from scientific bodies. He was a member of the staff of the metallurgical project in Chicago from 1942 to 1946 in connection with the wartime atomic bomb development.

NUCLEAR EXPERT
SPEAKS BY CURSON
VISITS RICHLAND
2/28/50

RICHLAND, Wash., Feb. 28.—Dr. Glenn T. Seaborg, famous nuclear scientist, is here for a two-day inspection of Hanford operations.

Dr. Seaborg is a discoverer of four of the transuranic elements. He is a professor of chemistry at the University of California and has been a member of the President's advisory committee on atomic energy since 1946.

His work has been in neutron reaction, radioactive isotopes, fission products of uranium and transuranium elements and identification of various nuclear reactions induced and resulting from operation of the Berkeley, Calif., cyclotron.

He will address the Richland section of the American Chemical society tonight at 8 in the Jefferson school cafeteria.

His topic will be "High Energy Nuclear Reaction."

NEWS

HANFORD WORKS

Richland, Wash., March 10, 1950



INSPECTING OPERATIONS, Dr. Glenn T. Seaborg, (Center) member of the General Advisory Committee on Atomic Energy, met with GE and AEC officials during his recent visit here. He is pictured at the close of a conference with (from left) A. B. Greninger, G-E Technical Divisions Manager; G-E Vice-President G. R. Prout; D. G. Sturges, Chief AEC Operations Division; and Hanford AEC Manager F. C. Schlemmer.

98th Element Found

New UC Heavyweight Is Named Californium

By JAMES G. CHESNUTT

Discovery of a new heavyweight element, the second within two months, was announced today by the University of California.

It is element 98, named californium for the university and the state of its discovery.

Like element 97, berkelium, which was announced last January 15, it is a synthetic product of cyclotron bombardment which does not appear in nature, but probably did exist briefly when the earth was new some 2,000,000,000 years ago.

45 MINUTE HALF LIFE

Unlike uranium (element 92) and plutonium (94), the new element has no practical place in the field of atomic energy, the university announcement said. Its importance lies in furthering man's understanding of matter.

Californium, an intensely radioactive element, has a half life of only 45 minutes. In that period, half of any given amount loses its radioactivity and decays into a lighter element.

The university sample, so small that it was invisible, was made in the Crocker Laboratory's 60 inch cyclotron by bombarding curium (element 96) with 35,000,000 electron volt alpha particles, the nuclei of helium atoms.

The weight of the curium target was only a few millionths of a gram and the amount of californium produced far less than that. However, it was possible to detect the presence of the new element, despite the fact it could not be seen, by a quick chemical separation process and by its radioactivity pattern.

The Berkeley scientists who reported the discovery of californium are Dr. Stanley G. Thompson, Kenneth Street Jr., Albert Ghiorso, research chemist, and Dr. Glenn T. Seaborg, professor of chemistry at Berkeley and one of the world's foremost nuclear chemists.

Dr. Seaborg, now 37, was co-discoverer of five of the six transuranium elements.

CALIFORNIUM HEAVIEST

The bombardments which produced the element were made in Crocker Laboratory, in charge of Dr. Joseph G. Hamilton, associate professor of medical physics at Berkeley and associate professor of experimental medicine and radiology in the university's medical school in San Francisco.

Uranium is the heaviest element found in nature. All elements which have greater atomic weights are synthetic. The new californium is the heaviest of all.

UC Cyclotron Produces Another New Element

S.F. CHRONICLE
3/12/50

A new element has been produced by the University of California 60-inch cyclotron, university scientists reported yesterday.

It has been named californium after the university and the State. It bears the atomic number 98, which means that it has 98 electrons circled about its nucleus—six more than uranium, the heaviest element found in nature.

Californium was produced by a team of researchers headed by Dr. Glenn T. Seaborg, who, since 1940, has been discoverer or co-discoverer of four other new elements. Other

members of the research team are Dr. Stanley G. Thompson, Kenneth Street Jr., and Albert Ghiorso.

No one has seen the new element. It has been produced in quantities so small that its existence is known only by chemical tests of a tiny amount of matter.

Dr. Seaborg declared that it has no use for either atomic bombs or atomic power. Its value lies in helping to expand man's knowledge of matter.

The tests for the new element had to be performed rapidly, since it

is so intensely radioactive that in 45 minutes half of its atoms decay into lighter elements.

Production of new elements has been going on since 1940. In all, nine elements not found in nature have been produced synthetically—seven of them in the 60-inch cyclotron at Berkeley.

The production is done by firing alpha particles at other elements. An alpha particle, which is the nucleus of a helium atom, when fired at just the right speed will stick to the nucleus of another atom

and change it into a different element.

Three of the man-made elements lie within the regular range of natural elements—that is, somewhere between hydrogen, which has one electron, and uranium, which has 92. The other six, of which californium is the latest and heaviest, are all heavier than uranium.

Dr. Seaborg explained that it is generally believed that all these elements, and perhaps some still heavier, were present in the earth

at the time of its formation. However, since they are all intensely radioactive, they have decayed over the years so that they are no longer found in nature.

Dr. Seaborg also explained that the 60-inch cyclotron makes a better tool for the production of new elements than does the giant 184-inch cyclotron. The 60-inch machine fires particles at just the right speeds to stick to the target, while the 184-inch cyclotron tends to fire them at such speeds that they smash the atoms in the target.

BERK. GAZETTE 3/12/50

UC Scientists Make New Atom, Californium, Here

Berkeley scientists have made another atom in the laboratory, the heaviest ever known.

It is element 98, named Californium for the State and the university that produced it.

The researchers who reported the discovery are Drs. Stanley G. Thompson, Kenneth Street Jr., Albert Ghiorso and Glenn T. Seaborg, all of the University of California's Radiation Laboratory and Chemistry Department.

Element 98 stands six steps up the periodic table from uranium, the most massive atom in nature. All the atoms, from 93 on, are man-made.

Californium was made by bombarding element 96, one of the "synthetic" atoms, with 35,000,000 electron-volt alpha particles (the nuclei of helium atoms) fired from the University's 60-inch Crocker Cyclotron.

The scientists did not make enough of element 98 to make it visible. The weight of the curium target was only a few millionths of a gram. That meant they had to work fast to identify the element after it was bombarded.

First, they subjected it to quick chemical separation processes and they tested it for radioactivity. When both chemical properties and the typical radioactivity pattern were confirmed according to the way the scientists previously predicted, it was possible to say a new element was produced.

INTENSELY RADIOACTIVE

Element 98 is so intensely radioactive that half of a given quantity loses its radioactivity and transforms itself into a lighter element within 45 minutes. It decays by emitting alpha particles.

The new element has no practical place in atomic energy, either for atomic bombs or power. But science says it will expand our understanding of matter.

Thompson, Ghiorso and Seaborg last January announced the discovery of element 97, named Berkelium, another synthetic atom. Seaborg has led groups of scientists responsible for discovery of all heavier than uranium elements except element 93, neptunium.

Seaborg suggested the name Californium for element 98 because of its chemical similarity to element 66, dysprosium, a Greek word meaning "difficult to get at." He said explorers for another element a century ago "found it difficult to get to California."

ATOM SMASHERS FIND INVISIBLE NEW ELEMENT

Berkeley, Cal., March 17 (AP)—A new kind of atom, the heaviest ever known, has been found by University of California researchers, it was reported today.

The new substance is element 98. It probably never will be seen by human eyes. It is no good as a source of atomic energy, but it adds to scientists' still limited understanding of how matter originally was formed.

A team of researchers headed by Dr. Glenn T. Seaborg, noted nuclear chemist, found the element. They worked under a contract with the atomic energy commission.

Sixth Recent Discovery

Element 98 is the sixth new substance to be found by atom smashing methods. The others are No. 93, neptunium; No. 94, plutonium; No. 95, americium, No. 96, curium, and No. 97, berkelium. Uranium's element 92 which, until the atomic age, was known as the heaviest of the known chemical elements.

The researchers produced elements 98 by bombarding curium atoms with alpha particles, which are the cores of helium atoms.

No. 98 is wildly radioactive. After a few hours the new atom throws off its newly acquired alpha particle and becomes curium again.

Sheds Light on Matter

This explains why element 98, as well as its buildup predecessors, shed light on the formation of matter.

There is a theory among scientists that all possible forms of matter were created almost instantly in one cataclysmic event at the very beginning of things.

These forms, the theory holds, included all the regular 92 elements plus all the possible variations. This would include the hundreds of isotopes, the heavier or lighter chemical duplicates of the 92 conventional kinds of atoms. These isotopes have been made by the atom smashers.

Variations are Unstable

Many of the variations, like No. 98, are radioactive and therefore unstable. It is theorized that soon

OK. T. S. P. 3/17/50

Powerful New Element Found

BERKELEY, March 17.—University of California atom smashers have produced another new and violently radioactive element—one which seems to fit dramatically into the "jigsaw puzzle of creation."

Announced today by world-famous Chemist Dr. Glen T. Seaborg, the new element, number 98 on the chemical periodic table, will be named "californium" after the University and state.

The announcement of element 98 by Dr. Seaborg came only a little more than a month after his discovery of element 97, called "berkelium," after the City of Berkeley.

Element 98 is a synthetic unit of matter which does not exist in nature and has never before been observed on earth, according to Dr. Seaborg.

'CURIUM' BLASTED

It was made by bombarding artificially-made "curium," element 96, with 35-million electron volt alpha particles fired from the University's 60-inch Crocker Radiation Laboratory cyclotron.

The new element, says Dr. Seaborg, is so intensely radioactive that it loses half of its potency in 45 minutes. Not enough of the element was made in the bombardment to be visible, the weight of the curium target being only a few millionths of a gram, he said.

after the instant of creation the unstable ones began turning into more stable forms, until finally there were only the 92 regular and comparatively stable ones left.

The wildness of 98 seems to fit into that picture. It is so radioactive that the researchers had to work with extreme speed to identify it before it disappeared. The amount made was too small to be visible.

According to the scientist, who is responsible for five of the six man-made elements, the new element has no practical place in atomic energy either for atomic bombs or power.

He pointed out however, that it is of fundamental importance in explaining man's understanding of matter.

The near simultaneous discovery of the two new elements, Dr. Seaborg attributed to the similarity of the problems in making them.

PREDICTION POSSIBLE

"On the basis of this," he said, "it was possible to predict in advance the chemical properties of the new element as well as its potency."

Assisting Dr. Seaborg in the discovery were Drs. Stanley G. Thompson, Kenneth Street Jr., and Albert Ghiorso. The bombardments which produced the new element were made by a group in the Crocker Laboratory under the direction of Dr. Joseph G. Hamilton, associate professor of medical physics.

New Element

Discovered

S.F. EXAMINER 2/18/50

U. C. Scientists Find No. 98

By HENRY PALM

The atomic scientists of the University of California's radiation laboratory have isolated a brand new element—No. 98 in the periodic table, the heaviest and most volatile of them all.

In announcing discovery of this newest of the elements yesterday, Dr. Glenn T. Seaborg, the famed nuclear chemist, said it had been tentatively dubbed Californium, in honor of the school and State in which it was nurtured into brief being.

Credit for the discovery of the intensely radioactive element goes to Seaborg and a group of research associates, including Dr. Stanley G. Thompson, Kenneth Street Jr., and Albert Ghiorso.

Californium is six full steps heavier than the heaviest element found in nature—uranium, No. 92, the basic fuel for the atom bomb.

SIX ADDED—

For years scientists assumed that uranium was the last of the elements, and periodic tables ended at 92.

However, atomic science and the cyclotron made liars of the experts, and now six synthetic elements have been added to the scale. The others:

No. 93, Neptunium; No. 94, Plutonium; No. 95, Americum;

Substance Called Californium,
Is Number 98

(Continued from Page One)

No. 96, Curium, and No. 97, Berklum.

The last was discovered by Doctor Seaborg and his co-workers at Berkeley last January.

The new element, which is of no apparent value as a source of atomic energy, is incredibly radioactive, as indicated by its half-life of 45 minutes, i.e. half of it disintegrates every 45 minutes.

ATOMS CHANGED—

Like the other newcomers, Californium was manufactured by adding alpha particles (the cores of helium atoms) to curium atoms.

The curium atoms were previously manufactured by adding alpha particles to natural uranium.

The particles, each containing two protons and two neutrons, were whirled about in the "little," 60-inch cyclotron and shot into the curium target.

There they adhered to the curium nuclei, increasing the size of the latter and forming, for a brief time, the new Californium.

The large 184-inch cyclotron could not be used because its power would have shattered the curium nuclei. The low-powered machine provided just enough impetus to overcome the natural resistance around the curium atoms.

Within a few hours the tiny, sub-microscopic bits of Californium threw off enough of their newly acquired weight to become curium again.

This action explains why Element 98 and its five artificial predecessors may shed light on the basic formation of all matter.

DISINTEGRATE—

There is a theory among scientists that all possible forms of matter were created almost instantaneously in one cataclysmic moment at the very beginning of time.

These forms include all the regular ninety-two elements, plus all their possible variations—the hundreds of isotopes (heavier or lighter chemical duplicates of the ninety-two conventional atoms) which have been manufactured in recent years.

Most of these variations—like plutonium in the atom bomb—are radioactive and hence unstable. It is theorized that soon after the instant of creation the unstable variation began to disintegrate into more stable forms, finally leaving just the ninety-two regular elements.

BACKS THEORY—

The wildness of 98 seemed to fit into that picture. The researchers had to work with extreme speed to identify it before it disappeared.

Physicists customarily label new elements with names related to elements lower in the periodic table, with similar chemical properties.

In this case the similar element was No. 66, dysprosium, named for the Greek word meaning "hard to get at."

"The best we can do," Doctor Seaborg said, in explaining the choice of Californium as a name, "is to point out that searchers a century ago found it hard to get to California."

Record Wallop

Last week the world's most powerful atom smasher went into action. It was Columbia University's new synchro-cyclotron, which has been under construction for three years and a month on a grassy 67-acre estate overlooking the Hudson River at Irvington, N. Y. So far

Newsweek, March 27, 1950

the machine has been operated at a conservative 385,000,000 volts, but there is little doubt that it can be stepped up to more than 400,000,000. No other atom smasher can deliver more than about 330,000,000 volts.*

Everything about the Columbia cyclotron is big. Its magnet, 170 inches in diameter, is 2,500 tons of steel. It drains the output of a 2,300,000-watt electrical substation. To cool the 150-ton copper coils, which energize the magnet, a torrent of 2,000 gallons per minute of oil is needed, and this oil in turn is cooled by 1,000 gallons per minute of water.

Inside the squat concrete building that houses the cyclotron Columbia and visiting scientists will explore the atom more thoroughly than ever before. What they will find is impossible to tell in advance. But it may be that the proton, up to now regarded as a fundamental building block of matter, will break into smaller pieces—sub-subatomic particles.

► Across the continent from Irvington, the world's largest atom also made its public debut last week. It was a new chemical element (number 98), just discovered by the same University of California scientific team which made berkelium, element 97 (NEWSWEEK, Jan. 30).

Named californium by its discoverers, the new element was made artificially by bombarding curium, element 96, with charged helium atoms (alpha particles). Like berkelium, californium is so radioactive that it will probably never be isolated in visible amounts or put to practical use.

The trick in making californium was to have the alpha particles moving at just the right speed when they collided with the curium atoms. This, it turned out, could be done by using California's "baby" 60-inch cyclotron instead of the big 184-incher. Alpha particles generated by the big machine were hurled so fast that they shattered the curium atoms.

BERKELEY HIGH SCHOOL JACKET 2/31/50
Celebrity Circle - Dr. G. Seaborg

BY DON KECHELY

"What are the prospects for a high school student entering the field of nuclear physics and chemistry?" was the question put to Dr. Glenn T. Seaborg, professor of chemistry at the University of California and co-discoverer of five transuranium elements, during a recent interview held in his office at the U. C. Radiation Laboratory. Dr. Seaborg answered thoughtfully, "The prospects are excellent for good students, those who have a liking for physics, chemistry, and mathematics." When asked how to go about entering this field, Dr. Seaborg stated, "As far as high school is concerned, the student should take all the math offered, through trigonometry, chemistry and Physics. Make college recommending grades. Then," he continued, "go to a school which is strong in nuclear physics and chemistry." He explained, "This is more important in graduate schools; for undergraduate work, any sound school is adequate."

Dr. Seaborg is the co-discoverer of plutonium, U-233, americium, curium, berkelium, and californium. Discovery of the latter was announced March 17, 1950. Perhaps his most important contribution to science was his discovery that the transuranium elements are similar to the rare-earth elements.

When questioned about the use of the two most recently discovered elements, berkelium (element 97) and californium (element 98), he remarked that they are of use only in correlating the knowledge of chemical and nuclear properties; they are also to be used in predicting the properties of the forthcoming elements.

Dr. Seaborg mentioned the fact that all elements above lead on the periodic table are radio-active. He explained radio-active as be-

ing the term applied to the process whereby one element transforms itself into another by emitting some fundamental particle, either an electron or alpha particle. The radio-active element will usually end up as lead, but it sometimes takes thousands of years.

Dr. Seaborg feels that the main place of the atom in peace will be in the use of radio-active tracers in the study of disease and its cure. He also thinks that the atom will be harnessed, but it will take longer than most people realize, perhaps as long as ten years.

He was the "Alumnus of the Year" at California for 1948; this ranks him with such famous persons as Jimmy Doolittle, Gov. Earl Warren, and Dr. Robert Gordon Sproul, president of the University. Some of the other honors that Dr. Seaborg has received are: "Chemist of the Year" for 1946, \$1,000 Pure Chemistry Award in 1947, the U. S. Jr. Chamber of Commerce included him in the ten outstanding young men for 1947, and he was invited to Sweden last fall to address the Royal Academy of Science. His publications now stand at about one-hundred.

Dr. Seaborg is a tall, slim young man who in stature strongly resembles Abraham Lincoln, whom he greatly admires. He has a wife, Helen, and three children. His oldest child is Peter, age four years. The other two children are a girl, Lynne, two and one-half years, and David, one.

Dr. Seaborg's off-duty hours are spent playing golf, reading, and watching television. He also likes all kinds of sports, and wouldn't think of missing one of Cal's home games. He enjoys all kinds of music, popular as well as semi-classical. He doesn't enjoy "bop." He doesn't go to movies often, but he does like a good western.

Educated Half-Wits

In some cases half a brain is better than one. At least, this holds true for Harry Harlow's monkeys.

In his University of Wisconsin psychology laboratory, where he studies basic learning processes (NEWSWEEK, Aug. 22, 1949), Professor Harlow performed drastic brain surgery on several monkeys. He removed cortical tissue (the gray matter that handles thinking) from one half the brain, taking care not to damage the motor and sensory regions underneath the cortex.

When it came to solving problems, the half-witted animals were on the whole less clever than normal monkeys. But partly decorticated animals which had previously been educated in solving problems proved brighter than untrained normal subjects.

Harlow concluded: "It is apparently better to be a half-brained genius than a full-brained dolt."

The Law and the Atom

During the building of the A-bomb, scientists made hundreds of thousands of inventions. The Atomic Energy Act stipulated that no patents should be granted on inventions connected with nuclear weapons. And pre-Manhattan-project patents on the bomb were revoked.

On the other hand, the act set up a patent compensation board to study claims of inventors whose patents had been canceled. On March 1, the findings of the first case were released.

Nellie Pauline Fletcher and her husband, William Arthur Fletcher, had asked "a multiple of millions of dollars" for three items, which they claimed the AEC had used, including a combination lamp and flower holder. The Fetters were turned down.

This week, on the compensation board's first birthday, only six other claims were on file, including that of F. P. Fulmer of Birmingham, Ala., who asserted that he could counteract atomic explosions. He felt that by detonating shells or grenades filled with his home-made chemical mixture, an A-bomb burst could be rendered harmless.

But some of the other cases weren't funny. Glenn T. Seaborg, University of California nuclear chemist, asked that he and his associates be compensated for a secret chemical separation process worked out before the bomb project started. And Nobel Prize-winning physicist Enrico Fermi put in a claim for \$1,900,000 for a way to produce radioactive isotopes by bombarding materials with slow neutrons. He and five other Italians registered a United States patent on this process in October 1935.

The cases are decided at monthly

and exchange the resulting data on a cooperative basis. * * *

4/10/50
EA FLOOR
N.Y. TIMES

along its entire length. The crack was found to be a mile deep and from one to five miles wide at the bottom, and from four to twenty miles wide at the top.

HEAVY ELEMENTS—

Nobel Laureate Glenn T. Seaborg, co-discoverer of elements 94 (plutonium) to 101 (mendelievium), has reported that a quantity of twelve kilograms (26.4 pounds) of plutonium has recently been placed into a nuclear reactor at the Savannah River facility of the Atomic Energy Commission, where it is being subjected to intense neutron bombardment. In two or three years the transmutations that will have occurred will yield about 100 grams (about 3 ounces) of curium (element 96), plus other heavy elements.

The curium, much more than has ever been produced before, will be subjected to more neutron bombardment in a more powerful nuclear reactor, and at the end of two or three more years, he said, "we will be able to extract about a milligram of californium (element 98)."

This, Dr. Seaborg pointed out, will be many times more californium than scientists have ever been able to assemble; it will be "a treasure worth millions of dollars and have intangible value beyond price." Some of it will be used to create much larger amounts than ever before of elements 99 (einsteinium) and 100 (fermium), while part of it will be used in an effort to create elements 101 and 102, and the still-undiscovered elements 103 and beyond.

Atomic Energy Pays Off Big in

DETROIT FREE PRESS 4/17/50

BY ROBERT GOLDMAN
Free Press Staff Writer

America's wartime atomic energy discoveries are already paying off in a big way in peacetime application, according to Dr. Glenn T. Seaborg, internationally known chemist.

A member of President Truman's advisory committee to the Atomic Energy Commission, Dr. Seaborg said:

"It is my guess that wide peacetime application of atomic power for, say ships, will not come for 10 years.

"But I consider more important that that, the present use of radio-

active materials in medical research and treatment and the biological sciences."

DR. SEABORG, a University of California faculty member and a native of Ishpeming, said the use of atomic materials in medicine "is in full swing today."

He asserted that their importance in medical research now "can hardly be overestimated."

Dr. Seaborg is in Detroit to attend the 117th annual meeting of the American Chemical Society to be held Monday through Friday.

More than 3,000 scientists are expected to attend the sessions in the Statler, Book-Cadillac and Tuller hotels.

DR. SEABORG and his associates recently discovered two new elements—Berkelium and Californium.

They were named after Berkeley, the home of the University of California, and the State.

Dr. Seaborg said the new elements, the 97th and 98th discovered, might add to the knowledge of nuclear materials.

He said that while neither of

Peacetime, Scientist Says

the two new elements had a direct atomic application, it was hoped that they would increase the understanding of plutonium, one of the A-bomb elements.

BOTH NEW ELEMENTS, Dr. Seaborg said, have been produced

only in invisible quantities.

The highlight of Monday's program will be an address in the Music Hall by Maj. Gen. Anthony C. McAuliffe, who defended Bastogne in the Battle of the Bulge.

Gen. McAuliffe, now head of the Army Chemical Corps, will describe the work of the Corps.

Finds Elements



DR. GLENN T. SEABORG
Attends meeting of chemists

DETROIT TIMES 4/17/50

Visiting Chemists To Tour Plants

Interest of 2,500 chemists attending the 117th national meeting of the American Chemical Society centered today in Detroit's industrial, educational and modern research facilities.

The convention opened yesterday in the Hotel Statler and will continue through Thursday.

SPLIT INTO 3 SECTIONS

With 62,000 members nationally, the chemists have divided their convention into three sections. Meetings already have been held in Houston and Philadelphia.

Tours of large industrial plants are scheduled for tomorrow, Wednesday and Thursday.

Nine of the society's 19 divisions will conduct separate programs, ranging from the study of paint and varnish to molecular structure.

Highlighting today's session will be an address in Music Hall tonight by Gen. Anthony C. McAuliffe, who said "Nuts!" to the Germans at Bastogne. He is chief of the army's chemical corps.

ATOMIC EXPERT HERE

The address will be followed with an all-convention mixer in the ballroom of the Book-Cadillac Hotel.

Among those attending the meeting is Dr. Glenn T. Seaborg, internationally known scientist and a member of President Truman's advisory committee to the atomic energy commission.

A native of Ishpeming and a University of California faculty member, Dr. Seaborg said:

"We cannot overestimate the importance of atomic materials in medical research.

FOUND 2 ELEMENTS

"It is my guess that wide peacetime application of atomic power for, say, ships, will not come for at least 10 years, but the present use of radioactive materials in biological science is most important."

It was Dr. Seaborg and his associates in California who discovered the two new elements, Nos. 97 and 98, which he said might add to the knowledge of nuclear materials. He said it was hoped these elements might also increase the understanding of plutonium, an A-bomb element.

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The Detroit News

THE HOME NEWSPAPER FOR MORE THAN 76 YEARS

A Politically Independent Publication Not Affiliated With Any Group of Newspapers

MONDAY, APRIL 17, 1950, 77th Year, No. 238

IF MAN WILL LEARN TO BEHAVE

Science Looks to a Golden Age

By ALLEN SHOENFIELD.
"LIFE could be beautiful."
Not only that, in the opinion of early registrants for the 117th annual meeting of the American Chemical Society, opening four days of discussions here, today, but man's life-span could be greatly extended, food could be produced in abundance, many of the chronic diseases could be conquered and the materials for

adding to man's safety, comfort and convenience might be had for the grasping, if—
"If man ever learns to live with his fellows as he is rapidly learning to live with his physical environment, he could create a veritable paradise on this planet," in the opinion of Dr. Alden H. Emery, of Washington, executive secretary of the American Chemical Society.
Dr. Emery voiced his thoughts

on the future of science, implemented by chemistry, as other members of the society put the final touches to learned papers on thermonuclear reactions and the fusion of elements involved in the manufacture and detonation of the hydrogen bomb.
Dr. Emery said: "I am not alarmed by statements that the earth is nearing the point where it will be unable to sustain a larger population. It may be true that, from the appearance of man on the earth down to 1850, the population increased only to 1,000,000,000 and that, since 1850, it has risen to 2,320,000,000.

VISION OF ABUNDANCE

"EVEN IF TRUE, there is ample evidence that over-populous nations may expect to gain 'lebensraum' not through aggression, genocide and acquisition of new territory at the expense of weaker peoples but, rather, through secrets now being disclosed in chemical and physical laboratories.

"I am convinced that the earth may be made to produce much more abundantly in the future than it ever has in the past.

"Perhaps it is a grim jest of fate that the atomic bomb which caused unparalleled destruction in Japan has placed in our hands a new tool for discovering the basic principles of growth in food animals and in plants.

"The simple fact that we are now able to render radio-active a particle of salt, whether subjected to treatment in a cyclotron or in an atomic pile, and to follow its course through a steer or stalk of corn, is indicative of what is to come. The relation of nutrition to growth is almost within our hands. All the mysteries of the

Science Offers a Golden Age If Only World Will Behave

(Concluded from Page One)

ductless glands and how they function promise soon to be unraveled.

"I believe that, within the visible future, we will be able to sustain not only all the life we can produce on this earth but also to banish the chronic maladies of cancer, hypertension, heart trouble and the other ills which render age intolerable.

ENTERING NEW ERA

"I WOULD NOT be so foolhardy as to set a date at which this prophecy will come true. I can only say that we are entering on a new era in science. We have

the means of knowing precisely what trace elements should be supplied to the soil and in what quantities to produce the maximum of food and fiber.

"We are using radio-active materials to control, exactly, innumerable industrial processes.

"We are on the threshold of discovering the cause of many hitherto baffling human ills.

"The outlook is brighter than at any time in human history—if only we can hold in check our hatreds and passions until scientists, engaged in pure research, have time to answer questions now pressing for attention."

The Federal Government must assume an ever-larger share of the burden of subsidizing investigations, he said.

Dr. Glenn T. Seaborg, native of Ishpeming, now a member of the faculty of the University of California and co-discoverer of the trans-uranium elements of berkelium and californium, expressed nearly the same sentiments.

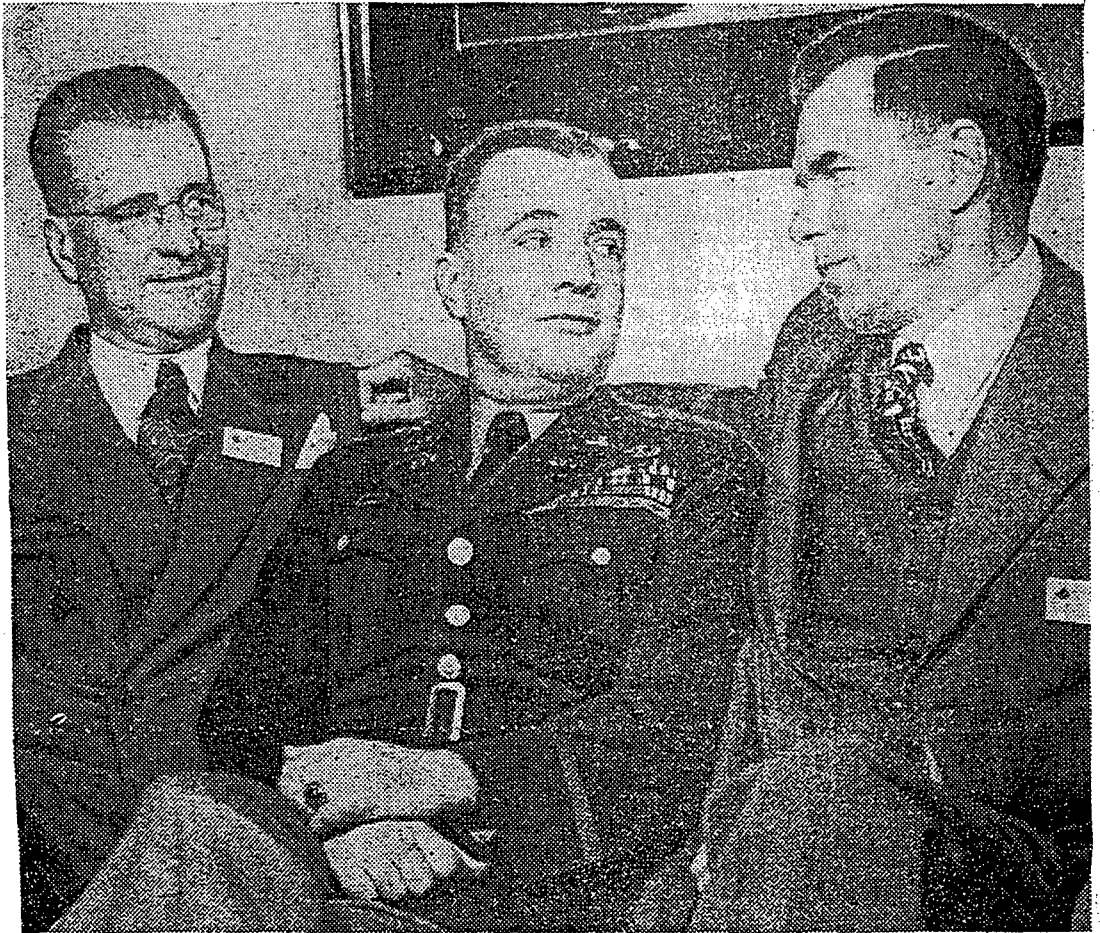
He predicted that atomic power would become the motive force for ground installations within the next 10 years, possibly for surface craft and submarines, less probably for airplanes.

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A CHEMISTRY CONFAB IN DETROIT

Detroit Times Photo

Dr. Ernest H. Volwiler (from left), president of the American Chemical Society; Maj.-Gen. Anthony C. McAuliffe, chief of the Army Chemical Corps, and Dr. Glenn T. Seaborg of the University of California, talking shop in the meeting of the American Chemical Society in Detroit Monday.



1950



SECTION ACTIVITIES

APRIL SPEAKER

DR. GLENN T. SEABORG was born in Ishpeming, Michigan, in 1912. He received the A.B. degree from the University of California at Los Angeles in 1934 and the Ph.D. degree in chemistry from the University of California at Berkeley in 1937. His professional career, since that time, has been as follows: Research Associate with Professor G. N. Lewis 1937-



1939; Instructor, Department of Chemistry, University of California 1939-1941; Assistant Professor 1941-1945 and Professor 1945- Department of Chemistry, University of California.

Dr. Seaborg's main field of investigation has been nuclear chemistry and nuclear physics. He is the co-discoverer of a number of artificial radioactive isotopes of elements, including: plutonium (at. no. 94) in 1940; fissionable isotope of plutonium, Pu 239 in 1941; americium (at. no. 95) in 1945; curium (at. no. 96) in 1944; fissionable isotope of uranium, U 233, in 1942;

isotope of neptunium, Np 237 (at. no. 93) in 1942; and berkelium (at. no. 97) in 1949. He is also a co-discoverer of the missing $4n + 1$ radioactive series (neptunium radioactive series).

He was on leave of absence from the University of California to the Metallurgical Laboratory of the University of Chicago from 1942 to 1946. He was primarily responsible for the laboratory development of the chemical separation procedures which were used in connection with the manufacture of plutonium at Clinton, Tennessee, and Hanford, Washington.

At present Dr. Seaborg is engaged in research work at the University of California on the transuranium elements and on the identification of the various high energy nuclear reactions induced by the Berkeley 184 inch cyclotron. He directs the work of a group of graduate students in the field of nuclear chemistry and gives undergraduate and graduate lectures in this field.

Dr. Seaborg's contributions have been widely recognized as the following list of honors will show: appointed in 1946 by President Truman to serve on the nine-man General Advisory Committee to the Atomic Energy Commission; Harrison Howe Memorial Lecturer of the Rochester, New York Section of the *American Chemical Society* (November, 1946); Councilor-at-large of the *American Chemical Society* in 1947; named "Chemist of the Year" for 1946 in an informal poll conducted by *Chemical and Engineering News*; 1947 "Award in Pure Chemistry" of the *American Chemical Society*; 1947 Nieuwland Lecturer at the University of Notre Dame; awarded 1948 William H. Nichols Medal by the New York Section of the *American Chemical Society*; member of Committee on Radioactive Constants of

the International Union of Chemistry; awarded 1948 John Ericsson Gold Medal of the American Society of Swedish Engineers; elected member National Academy of Sciences, April, 1948; University of California Alumni Award for 1948; elected Secretary-Treasurer of the Division of Physical and Inorganic Chemistry of the *American Chemical Society*, September, 1949; elected foreign member Royal Swedish Academy of Engineering Sciences, October, 1949; lecturer at Royal Swedish Academy of Sciences, Stockholm, October, 1949; Associate Editor of the *Journal of Chemical Physics*, 1948-50; member Editorial Board of *Journal of American Chemical Society*, 1950.

Since 1936 Dr. Seaborg has had about 100 papers on the general subject of nuclear chemistry and nuclear physics, artificial radioactivity, transuranium elements, applications of artificial radioactivity to chemistry, etc., including comprehensive reviews and compilations in *Reviews of Modern Physics* and *Chemical Reviews*. He is a member of the following societies: *American Chemical Society*, American Association for the Advancement of Science, Sigma Xi, Fellow of American Physical Society, Phi Beta Kappa, Alpha Chi Sigma, Phi Lambda Upsilon (elected Honorary Member, 1948), National Academy of Sciences, Royal Swedish Academy of Engineering Sciences, American Institute of Chemists.

SCIENCE SERVICE

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May 25, 1950

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1719 N Street, N. W. WASHINGTON 6, D. C.

Telephone NO. 2755

Cable Address Sciencem

May 25, 1950

Dr. G. T. Seaborg
University of California
Berkeley, Calif.

Dear Dr. Seaborg:

A sheet from one of our reports on science that has been issued to newspapers and magazines is enclosed because of your connection with one of the items that it contains. It is sent you for your information and files.

Science Service issues regular syndicate services which carry to over 400 subscribing newspapers and other publications in this country and abroad, authentic accounts of current scientific progress in all fields.

I thank you for your cooperation with Science Service. If you will continue to keep us in touch with your own work and that of your associates, we shall value this aid to our work of science popularization.

Sincerely,

Watson Davis
Watson Davis,
Director

WD/Bo

ATOM BOMB ELEMENT YIELDS
NEW LIGHT-WEIGHT ISOTOPES

5/23/50W

By SCIENCE SERVICE

BERKELEY, Calif. May - Three new light-weight varieties of the transuranium element, neptunium, are announced by a University of California team of scientists to the American Physical Society through the current Physical Review. The new isotopes have atomic weights of 231, 232 and 233 and they are made by smashing heavy hydrogen (deuterium) hearts into heavier atoms of uranium, the element 92 necessary to the atomic bomb.

Six other isotopes of this element number 93 in the periodic table were known previously. All of the new isotopes live only a matter of minutes, but there is one very long-lived variety of neptunium 237 discovered during atomic bomb research during the war. The new isotopes are believed to undergo fission.

The discoveries were made by Drs. L. B. Magnusson, S. G. Thompson and G. T. Seaborg.

00349

This Clipping From
CLEVELAND, OHIO
PLAIN DEALER
MAY 26 1950

Dr. Glenn T. Seaborg Rated Father of Three Elements

BY ELIZABETH JACOBSON

BERKELEY, Cal.—In 1947, the annual \$1,000 Pure Chemistry Award of the American Chemical Society for the "best chemical research accomplished by a man under 35" that year went to tall and scintillating Dr. Glenn T. Seaborg, director of the radiation and nuclear research work at the University of California's Berkeley branch.

And a year later, the society picked the same man for the coveted William H. Nichols medal.

In fact, the man who discovered plutonium (element 94) which figured so much in the development of atomic progress in World War II, when only 28, has been singled out by many groups including the United States Junior Chamber of Commerce and the American Society of Swedish Scientists for a list of honors.

Plays It Well

But these are things Dr. Seaborg doesn't spend much time thinking about.

"My own game is science, and oh yes, elements," Dr. Seaborg commented with a smile in his light brown eyes.

Elements are Dr. Seaborg's game, and he plays it well. Already he is the "father" of a number of other elements: americium (element 95), curium (element 96), and the newest one, californium (element 98), announced last March.

The busy scientist, who was born in a small mining town in Michigan, of Swedish-American parents, but spent his youth in Los Angeles, selected science while still a high school pupil.

"From then on it was work," Dr. Seaborg explained.

The year Dr. Seaborg enrolled in the University of California at the Los Angeles branch was 1929—depression year.

Works as Stevedore

But boy-scientist Seaborg came through, working as a stevedore in warehouses, as fruit picker in the San Joaquin Valley, and as this and that. In his junior year he won the Phi Beta Kappa pin.

For his postgraduate work, Dr. Seaborg transferred to the Berkeley campus where he came under the influence of the late Dr. Gilbert Newton Lewis, dean of the college of chemistry.

"I was lucky to know him," Dr. Seaborg said.

Dr. Lewis had a reputation for being able to talk science so that everyone could understand him. Dr. Seaborg may have picked this trick up from his "coach." At any rate, the lectures Dr. Seaborg



DR. GLENN T. SEABORG

gives annually at various colleges, which include the famous Faraday lecture at the California Institute of Technology in Pasadena, are

said to be extremely popular.

"Why, I even spoke at a Quiz-Kid program once," Dr. Seaborg explained proudly.

During the war Dr. Seaborg was stationed at the University of Chicago where he was one of the heads of the Manhattan Project at that campus. His work consisted of directing the separation of plutonium from uranium.

Mrs. Seaborg is also very much interested in science. In fact, she met her now famous husband while the latter was still only an assistant professor and she was a secretary to the head of the school's radiation laboratory; a position now held by him.

The Seaborgs are the parents of two small children, "who will no doubt also want to be scientists," Dr. Seaborg laughed.

In the World of the Atom

An Intimate Message From the Pacific Coast

CHRISTIAN SCIENCE
MONITOR 6/19/50

By Robert R. Brunn

SAN FRANCISCO

When you walk into an atomic research center—with concrete blocks piled about like the ruins of Karnak, green lines squiggling on control panels, warning devices honking, and people in general doing mysterious things—it's like thumbing through the pages of a lurid, astounding adventure magazine.

Those magazines featuring people exploring fantastic worlds in weird getups give you a comfortable sense of superiority. It can't be true. But in the University of California radiation laboratory it is true, or so the people there tell you.

Up on the California hills above San Francisco Bay some of the country's finest research physicists live out of our world, in the invisible universe of the atom and its nucleus.

This primary seat of nuclear research in the United States is a friendly enough place. Glossy red vending machines for a popular variety of pop reassure you that this is the United States of America and not Mars or a Hollywood set for a lost-world movie.

Several hundred people work on a factory scale among 4,000-ton magnets, great barn-like buildings, a maze of pipes and doubtless necessary impedimenta. On the carefully guarded hill other-world machines called cyclotron, betatron, synchrotron, and linear accelerator are speeding up and bombarding atomic particles which come out as beams to be studied on photographic plates.

In the control room of the prodigious atom-smashing cyclotron, three men lounge in brown overalls before yards of red lights and jumping needles. Green wavy lines wander across recording devices like neon yarn.

One of the men talks with an unseen partner over the telephone, his eyes on a particularly attractive dial that features slowly undulating waves of green. "OK turn it just a little more," he says, "just a teeny-weeny bit more."

His invisible colleague accurately interprets this technical comment, and he leans back smiling. He tells me that some of these meters are oscillographs and others are fluxometers. Let's leave it at that! What is important is that these technicians obviously know what they are doing.

And so do the great nuclear physicists and chemists such as Ernest O. Lawrence, director of the laboratory, Glenn T. Sea-

borg, Luis Alvarez, and others on the hill. All this spectacular equipment is the façade of their work.

Observing pictures of atoms disintegrating, they calculate, deduce, ponder, and discuss. Out of this thinking in the last six months, for example, have been brought to light two elements new to man. They are elements numbers 97 and 98 on the periodic table so familiar to every high school student of chemistry. Their names are berkelium and californium, for the city and state of their birth.

Under atomic bombardment californium came into being only this March, ushered in by Dr. Seaborg and his associates, who predicted its chemical properties in advance. It probably never will be made in visible quantities.

Californium is the heaviest atom ever known, mirroring its namesake's unabashed proclivity for the biggest and the best. This synthetic element, and the others re-created before it, give natural scientists some better idea of the make-up of the earth at its birth about 2,000,000,000 years ago.

And if you step outside the cyclotron building you see the orange girders of the nation's superatom smasher rising in a deeply gashed canyon. It's an AEC-sponsored 6,000,000,000 electron-volt bevatron that will cost \$9,000,000. (As these physicists probe deeper into the microscopic and beyond, costs and energy move further into the astronomic and beyond.)

The bevatron (bev for billions-electron-volts) is "the future." Its tremendous power may enable these pioneers to uncover more about the meson. The meson turned up in Berkeley most unexpectedly in 1948, as new and previously unheard-of parts of the atom are likely to do.

Mesons are now the key atomic particles of nuclear physics as they seem to be intimately tied up with the unknown forces that cement the atom's nucleus together. True to form in this astounding and adventurous Berkeley world, they exist for as little as a few millionths of a second.

So on the knobby Berkeley hills news in the strictest sense of that word is being made—new things basic to man's knowledge of the physical world are coming to light. It's a fantastic place to be all right, stranger than fiction, there where concrete floors pulsate under the contraction and relaxing of the giant magnets.

S.F. CHRONICLE 7/11/50
UC Scientists Tell About Isolating Weird New Element

BY MILTON SILVERMAN
 Science Writer, The Chronicle
 CHICAGO, Sept. 5.—University of California scientists today revealed the production of a metal which glows in the dark like a flashlight. They described a metal which is hot when it's cold.

They described a substance which is virtually a universal solvent, eating away any container in which it is placed.

They described metals which have never been seen.

They reported the production of elements which have probably not been present in the earth, or anywhere else in the universe since the universe was created some seven billion years ago.

Two centuries ago, such announcements would have had the Californians burned at the stake for witchcraft, black magic and general hanky-panky.

Today they won the applause of the American Chemical Society as outstanding achievements in the exploration of a new and fantastic field of research.

The California team, headed by Dr. Glenn Seaborg, announced for the first time the isolation of curium—Element 94.

Element 96—as a pure metallic element.

Made by bombarding other elements in a cyclotron, curium turned out to be a silvery metal with such intense radioactivity that it slowly corrodes any container, glows in the dark, and is always hot.

At room temperature, it actually has a surface temperature of about 300 degrees Fahrenheit, far higher than that of boiling water. Taken internally, it would undoubtedly be a deadly poison.

The scientists also announced the production of pure metallic americium—Element 95.

Element 98— and estimated the total amount in existence as about "a billionth of a billionth of a billionth of a gram."

With still another new created element: berkelium or Element 97, they reported "much more—about a hundred millionth of a billionth of a billionth of a gram."

Although neither californium nor

"So far," they said, "we have very little. It might take 500 years to produce a millionths of a gram." A gram is about a 30th of an ounce.

They likewise reported the preparation of "a few thousand atoms" of californium—Element 98—and they suspect the possibility of creating five additional elements—Numbers 99, 100, 101, 102 and 103—atombombarding techniques. "We are now looking for 99," Dr. Seaborg said.

The California workers reveal they suspect the possibility of creating five additional elements—Numbers 99, 100, 101, 102 and 103—atombombarding techniques. "We are now looking for 99," Dr. Seaborg said.

TACOMA, WASH.
 NEWS-TRIBUNE
 SEP 8 1950

Reach For 5 Elements

By **THOMAS R. HENRY**
 Science Editor
 North American Newspaper Alliance

CHICAGO, Sept. 8.—Chemists are trying to rebuild five elements that vanished from the earth at least 3,000,000,000 years ago.

When neptunium and plutonium, the latter the essential ingredient of the atomic bomb, were created out of uranium, a long path was opened into the future. In quick succession four other elements have been created in the great cyclotron of the University of California—americium, curium, berkelium and californium.

But even these, according to reports of Dr. Glenn T. Seaborg and his associates to the American Chemical society here, are only the beginning. Berkelium and californium both can be bombarded with alpha particles, the nuclei of helium atoms, and still heavier elements will be created.

Present calculations indicate that five more steps will be possible until a total of 103 elements is reached. Until six years ago, only 92 were known, ending with ura-

nium. These are all that exist in a natural state on earth, although there may be minute traces of plutonium and neptunium in rocks.

Each successive new atom will be heavier, containing more protons and neutrons in its nucleus. Also, each will be shorter-lived. It can be predicted that element 103 will have a half-life of only a few seconds, compared with about five years for berkelium and californium. Dr. Seaborg and his associates hope to produce, at best, only the minutest traces of the new fundamental substances. These, they expect, will be barely visible under high-powered magnification but probably can be traced by their behavior. The possible amounts which can be produced will be altogether too small to be of any practical use, except for scientific studies. One point of interest is that these substances probably already exist as contaminants in the plutonium of an atom bomb and may have considerable influence on its behavior.

The existence of the five undiscovered elements can be predicted almost with certainty because they belong in a special series leading upward from actinium, thorium and uranium. There is no absolute assurance that there may not be still heavier elements but they cannot be predicted because they would fall into a new and still unknown series.

SEP 13 1950

Chemists Trying To Rebuild Five Long Missing Elements

Chicago (NANA)—Chemists are trying to rebuild five elements that vanished from the earth at least 3,000,000,000 years ago.

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This Clipping From
SCIENCE NEWS LETTER
WASHINGTON, D. C.

SEP 16 1950

METALLURGY

Americium Is Light

➤ A HEAVY metal that is much lighter than expected has come to light with the metallic isolation of the universe's 95th element, americium, announced in Chicago, Ill., to the American Chemical Society by Dr. Edgar F. Westrum of the University of Michigan.

Plutonium, the modern A-bomb element, is number 94 and heaviest substance among the 98 elements known. Americium, just obtained in its silvery metallic form, has only about half its parent's density.

This means that even though americium's atomic weight is greater than that of plutonium, two bricks of americium would be necessary to counterbalance one of equal size made of plutonium. This is because inner forces give the americium atom a more expanded structure.

At least five new chemical elements beyond californium, number 98, will be discovered in the future. Dr. Glenn T. Seaborg, University of California chemist and

plutonium's discoverer, predicted in an interview in Chicago.

He is able to predict the chemical properties of the rest of what is called the actinide series, which ends with the element 103 whose atomic weight will be 267. Elements beyond 95 may be lighter than plutonium and uranium, if the tendency toward lower density shown by americium continues.

Only 5,000 atoms of the most recently discovered element, californium, existed, Dr. Seaborg said, and future new elements manufactured out of transuranium elements will be even rarer.

It is not known whether this process of synthetic building of elements duplicates ancient elements, long extinct, that once existed on earth or whether man has now gone nature one better and made materials that has hitherto been impossible.

Science News Letter, September 16, 1950

This Clipping From
TUCSON, ARIZ.
CITIZEN

NOV 28 1950

CALIFORNIUM

This may not be the time to bring it up, but are California scientists doing right by Texas and the rest of the 48 states?

Two research experts of the University of California tell the American Chemical Society meeting in Chicago that they have found two new elements of nature. This breaking of new frontiers in knowledge is fine. But look what the Berkeley professors call their discoveries: Berkelium and Californium.

There should be no place for chauvinism in science. Let's keep the Chamber of Commerce out of it. We'd be inclined to suggest a noncontroversial name like Texium instead, but for one fact: 5000 atoms of Californium weigh only one billionth of a billionth of a billionth of an ounce. There is nothing Texanic about such a lightweight.—Dallas News.

UNIVERSITY OF CALIFORNIA

The West Coast colossus has eight campuses, over forty thousand students and a thorny problem to solve in the loyalty oath

By Irving Stone

LAST year when one of the best triple-threat halfbacks in southern California graduated from high school he received flattering offers from Notre Dame, Southern California and several other colleges where football is more of a faith than a form of exercise. The boy and his father sat down at a table with pencil and paper and figured that the total value of one school's offer added up to \$20,000 over a four-year period. The best that the University of California could offer him was ninety cents an hour for maintenance work on the campus grounds. The boy's family was in moderate circumstances and could give him little help, yet no one at Berkeley was the slightest bit surprised when the young man turned up on registration day.

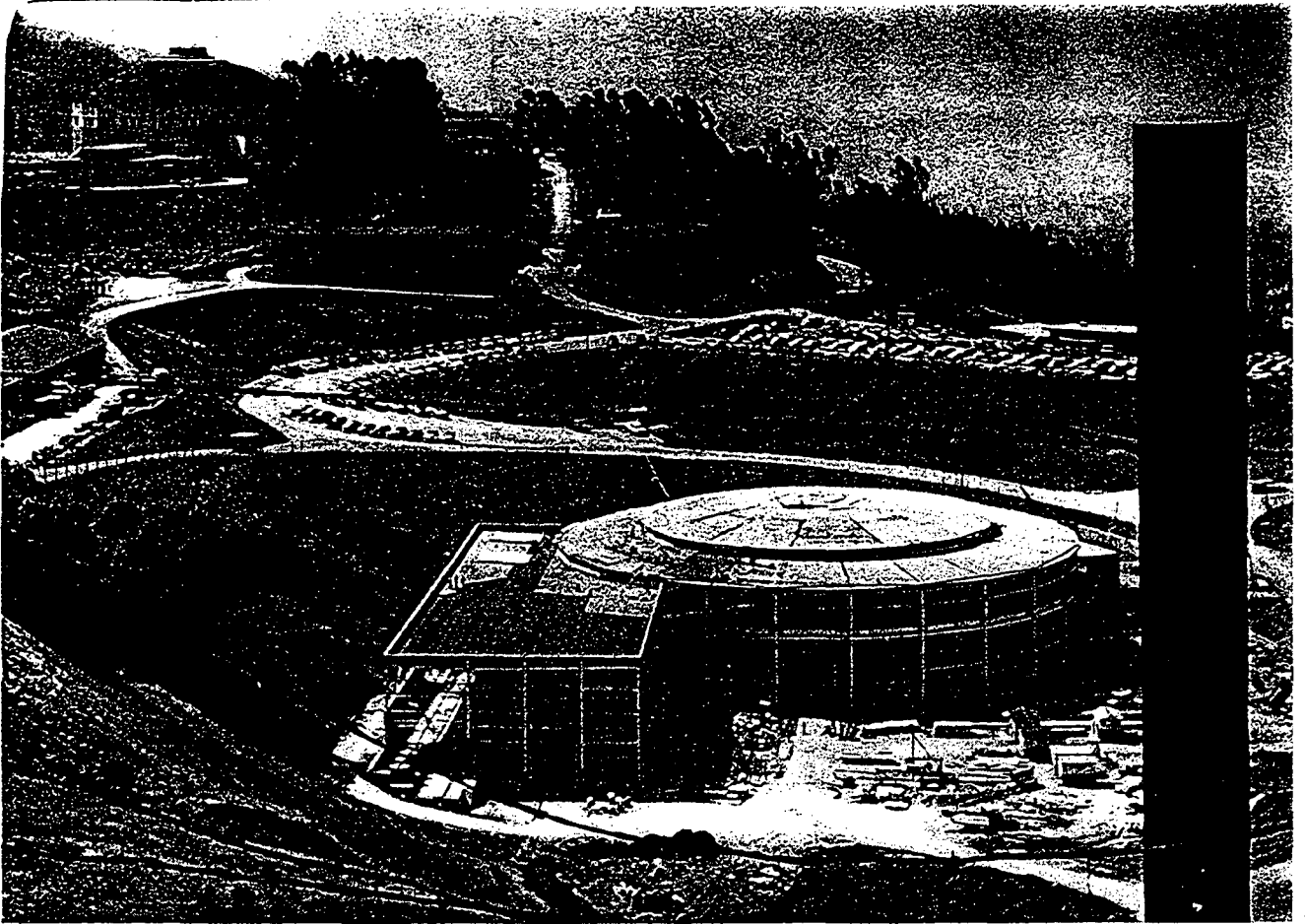
"I found the campus warm and friendly," said the boy, "and I figured I could be happy here."

When, in August of 1920, I walked up Telegraph Avenue and through Sather Gate with a

worn suitcase and a saxophone, my life savings of \$245 in greenbacks stuffed into the reed compartment, I too felt that the University of California—deserted at this six-o'clock supper hour—was a place where a stranger could feel at home. A deep purple had settled over the poppy-covered Berkeley hills, the chimesmaster atop the white Campanile was playing a Bach theme, and below me the setting sun had covered San Francisco Bay and the Golden Gate Strait with fiery pinks, corals and burnt orange. Down the path which led from the Chemistry Building and South Hall came a man on horseback, wearing a black cape, his white hair flowing to his shoulders. For a moment I thought it was an apparition; but when the man reached me, standing solitary and a little forlorn on the steps of Wheeler Hall, he stopped his horse, took off his wide-brimmed black hat, bowed to me with a warm, gracious smile, and said: "Good evening, sir." (Continued on Page 50)



Glenn T. Seaborg is one of world's foremost nuclear chemists, has helped discover new elements.



Part of the campus, but set off by barbed wire and FBI agents, is the Atomic Project. Cyclotron is at upper left of picture; betatron, under construction in foreground, will cost nine million dollars.

Scientifically, Cal keeps up with the atom

(Continued from Page 48) my seventeen years that anyone had called me sir. I did not know that I had been officially welcomed by Benjamin Ide Wheeler, president emeritus of the University, and the last of U. C.'s great educators to serve in this capacity; but even had I known, those words could not have sounded more beautiful.

It is nothing less than a minor miracle that the University can appear warm and friendly to newcomers today when one realizes its staggering size: 22,000 students in actual attendance in Berkeley, with a graduating class last June of 8000. To the students on the campus the University is not only the biggest in the world but unquestionably the best.

The figures for the University of California's eight campuses, of which Berkeley is the parent organization, are genuinely staggering: 42,000 students and 4188 faculty members from the Scripps Institute of Oceanography at La Jolla, near the Mexican border, to Riverside, deep in the



C. Donald Shane is the director of the Lick Observatory, presently constructing a 120-inch reflector.

Hans Reichenbach, a philosopher, wrestles with effects of relativity on man's role in world.



Karl F. Meyer, pathologist and epidemiologist, aided in eradication of bubonic plague in U.S.



citrus belt, where they specialize in tropical agriculture, to the University of California at Los Angeles, grown from a puling infant of a few years ago to a sprawling campus with 15,000 students, up the Pacific Coast to Santa Barbara, which is being developed into a model liberal-arts campus of 2130 students, to the Lick Observatory at Mt. Hamilton, where the Coast's astronomers are trained, to the great medical, dental, pharmacal, nursing and research schools in San Francisco, which at this very moment are training almost a thousand professionals, to Davis, the agricultural school in the Sacramento Valley with 1575 students, and finally to Berkeley, the great co-ordinating core. The actual physical campuses extend some 700 miles in length up the string-bean-shaped state.

BALANCED BIGNESS

The University is able to handle this problem of bigness—even in 1920 we had more than 8500 students on the Berkeley campus—because it has always lived with it, recognized its danger, and worked hard to compensate. Thus it has been better off than colleges which had been small and protected in size, only to have bigness thrust upon them after World War II.

There are always lots and lots of students everywhere at California in the library, in classes, on the walks, but the air crackles with so much accomplishment, so much intellectual, scientific and artistic excitement that the youngsters don't have time to realize they are crowded. Students coming from rural high schools or transferring from small colleges, who feared they might get lonely or lost, find themselves swept up in a maelstrom of intimates and activities. The all-pervading warmth and friendliness on the campus has actually intensified rather than decreased with size.

And on the hill, towering over the University, stands the cyclotron building where Nobel-prize winner Ernest Lawrence, who designed the machine that first smashed the atom, is now developing radioactive compounds. In my idyllic youth we walked up there among the fields of poppies, hand in hand with our girl, or with a volume of Bernard Shaw's plays under our arm.

Photographs by Ernest Kleiberg

OAKLAND TRIBUNE 1/18/51
U.C. Science Projects Win Commendation

BERKELEY, Jan. 18.—Two University of California research projects today were named among the "top 10 science advances of 1950" by Watson Davis, director of Science Service.

One was the discovery of the "Mid-Pacific" mountains in the Central Pacific last summer by a joint U.S. Navy-University of California expedition. The expedition, which included scientists from Scripps Institution of Oceanography and U.C.L.A., was led by Dr. Roger Revelle of Scripps.

The other was the creation of two new trans-uranium elements, 97 and 98, berkelium and californium. This project was under the direction of Dr. Glenn T. Seaborg professor of chemistry.

CP L. MONTHLY 7/51
**University Research
Rated in Top Ten**

At least two University of California Research projects have been ranked among the top ten science advances for 1950 by Watson Davis, director of Science Service.

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The other was creation of two new transuranium elements, 97 and 98, berkelium and californium, in the radiation laboratory. This work was led by Glenn T. Seaborg '34, professor of chemistry.

U.C. FACULTY MEMBERS TO ANSWER PROBLEMS AT ALUMNI INSTITUTE

BERKELEY, Feb. 9.—Outstanding University of California faculty members will seek to give answers to problems of every day living in troubled times at an annual alumni institute to be held

on the Berkeley campus on February 17.

A series of seminars during morning and afternoon sessions will have the following speakers and themes:

Ira W. Cross, Flood professor of

economics, "Where Are We Going Economically?"; William Wurster, dean of the college of architecture, "Outdoor Living in California"; Glenn T. Seaborg, professor of chemistry, "Atomic Energy in Peace or War"; Russell

Ball, chief of research service branch, Berkeley area, Atomic Energy Commission, "Civilian Defense for an Atomic Age"; Catherine Landreth, associate professor of home economics, "Your Children in These Troubled

Times," and Robert Kerner, Sather professor of history, "War at Home or Abroad."

The institute will open at 10 a.m. with a panel on "The Campus and University," in which speakers will be Dr. George A.

Oakland Tribune, Friday, Feb

Pettitt, administrative assistant to President Robert Gordon Sproul; Robert Evans, supervising architect for the university; Sally Marsh, A.S.U.C. vice-president, and Stanley E. McCaffrey, executive manager of the Alumni Association.

2/14/57

Everyday living

Alumni to sponsor institute

Six outstanding University professors will suggest answers to practical problems of everyday living during the annual California Bay Area Alumni institute to be held 9:30 a.m. to 4 p.m. Saturday on this campus.

The Institute will be sponsored by the Berkeley Alumni club and the California Alumni association, and it will include three sessions. The discussions during these sessions will be presented on a non-technical level.

During the opening session, to begin at 10 a.m. the topic for discussion will be "The Campus and University." The panel of speakers on this topic will include George Pettitt, Assistant to the President; Robert Evans, Supervising architect for the University; Sally Marsh, ASUC Vice-President, and Stanley E. McCaffrey, Executive manager, California Alumni association.

The second session at 11 a.m. will

be an informal seminar. Ira B. Cross, Flood professor of Economics, will speak on the topic, "Where Are We Going Economically?" William Wurster, dean of the college of architecture will discuss "Outdoor, Indoor Living in California," and Glenn T. Seaborg, professor of chemistry, will discuss "Atomic Energy in Peace or War."

Cross served on the staff of the U. S. War Shipping board during World War I, and since 1915 he has been dean of the faculty of the San Francisco chapter of the American Institute of Banking. He has also been vice-president of the American Economic association and president of the Pacific Economic association.

Wurster was dean of the school of architecture at the Massachusetts Institute of Technology 1944-

1950. He has also designed many outstanding works including the Valencia Gardens Housing project and Stern hall.

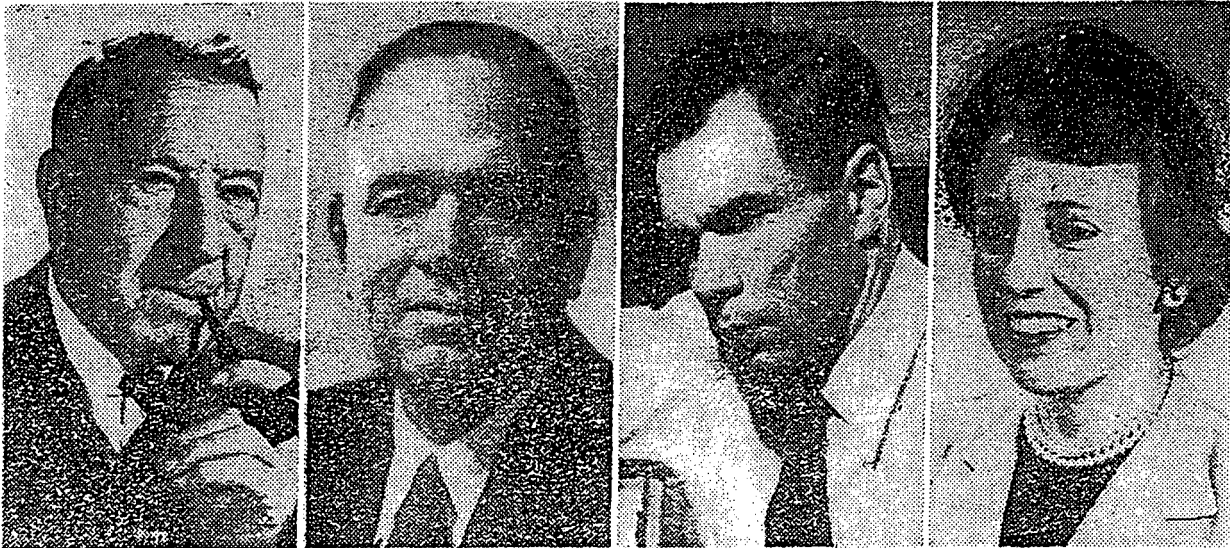
Seaborg was named "Alumnus of the Year" at the annual University Charter Day banquet. He led the work which resulted in the creation of two new trans-uranium elements, berkelium and californium.

The third session of the institute will be another informal seminar, which will begin at 2 p.m. Speakers will be Russell Ball, chief of the Research Service branch of Atomic Energy commission for the Berkeley area, who will discuss "Civilian Defense for an Atomic Age;" Catherine Landreth, associate professor of home economics and director of the nursery school, institute of child welfare, who will speak on the topic "Your Children in these Troubled Times," and Robert J. Kerner, Sather professor of history. Kerner's topic will be "War at Home or Abroad."

Kerner served during World War I in aiding the American commission to negotiate peace. He is the author of "Slavic Europe" and "The Urge to the Sea."

Registration for the institute will be held at 9:30 a.m. Saturday in the lobby of Wheeler auditorium. An admission charge of 50 cents will be charged students who wish to register.

OAKLAND, CALIFORNIA, FRIDAY, FEBRUARY 16, 1951



Ira B. Cross, Flood professor of economics; William Wurster, dean of the College of Architecture; Glenn T. Seaborg, professor of chemistry, Radiation Laboratory, and Dr. Catherine Landreth, associate professor of home economics and director of Nursery School, Institute of Child Welfare.

6 U.C. Profs To Address Alumni Institute

BERKELEY, Feb. 16.—Six outstanding University of California professors will suggest answers to practical problems of every day living in troubled times during the annual Bay Area Alumni Institute on the Berkeley campus tomorrow.

In informal morning seminar presentations, more than 600 alumni and students will hear Ira B. Cross, Flood professor of economics, answer the question, "Where Are We Going Economically?"

William Wurster, dean of the College of Architecture, describes merits of "Outdoor, Indoor Living in California" and Glenn T. Seaborg, professor of chemistry and nuclear scientist at the Berkeley Radiation Laboratory, discusses "Atomic Energy in Peace or War."

In the afternoon, seminar ses-



Outstanding University of California educators who will conduct seminar sessions on the Berkeley campus tomorrow are (left to right) Russell Ball, chief of the Research Service Branch of the Atomic Energy Commission for the Berkeley area; Robert J. Kerner, Sather professor of history; Dr.

sions will continue with Russell Ball, chief of the Research Service Branch of the Atomic Energy Commission for the Berkeley area, explaining "Civilian Defense for an Atomic Age"; Catherine Landreth, associate professor of

home economics and director of the Nursery School, Institute of Child Welfare, discussing "Your Children in These Troubled Times" and Robert J. Kerner, Sather professor of history and outstanding Russian authority speaking on "Local War or World

War?"

In an opening session at 10 a.m., "The Campus and the University" will be discussed by a panel consisting of George Pettitt, assistant to President Robert G. Sproul; Robert Evans, supervising architect for the university; Sally Marsh, A.S.U.C. vice-president and Stanley E. McCaffrey, executive manager of the California Alumni Association.

Alumni day tomorrow University professors to give views on current problems

Alumni and students attending tomorrow's annual California Bay Area Alumni Institute will have an opportunity to hear some outstanding University professors present their views on current problems.

The day will begin with registra-

tion at 9:30 a.m. in the lobby of

The institute, an all-day affair, will be divided into six informal seminar sessions, each to be addressed by a well known faculty member, and a panel discussion by University and ASUC officials.

Wheeler auditorium. There will be a fee of 50 cents a person. Registration will be followed by an opening session at which the general topic, "The Campus and University," will be discussed.

Three seminar sessions will be held at 11 a.m. and three at 2 p.m. Ira B. Cross, Flood professor of economics, will lead a morning seminar on the question, "Where Are We Going Economically?" Cross is well known at the University for his many years of teaching and his interest in public affairs.

The third morning seminar will be led by Glenn T. Seaborg, professor of chemistry. His topic will be "Atomic Energy in Peace or War."

Seaborg, whose field is nuclear physics and chemistry, is co-discoverer of a number of elements and has long been associated with work in the University radiation laboratory.

The topics to be discussed in the afternoon session also reflect a wartime trend. The first of the seminars will be "Civilian Defense for An Atomic Age." Russell Ball, chief of the research branch of the Atomic Energy commission in the Berkeley area, will lead the discussion.

Catherine Landreth, associate professor of home economics and director of the nursery school of the Institute of Child Welfare, will lead discussion on "Your Children in These Troubled Times." Aside from her duties in the department of home economics, Miss Landreth also lectures in psychology.

Another seminar will meet on the subject of "War at Home or Abroad." This seminar will be under the direction of Robert J. Kerner, Flood professor of history, who is director of the Slavic institute at the University and author of numerous texts.

The afternoon session will close at 3 p.m. with an hour's entertainment.

Topics have been chosen for general appeal and technical knowledge of the subjects is not necessary for their understanding. Students and alumni alike are welcome to attend any of the sessions.—
J. M.

New Elements In Quantity

BY DICK PEARCE

Scientists at the University of California have found a way to triple the size of the atomic bullets fired in their cyclotron, it was learned yesterday.

It is as though they had stepped up the caliber of their projectiles from rifle bullets to cannonballs.

With the heavier projectiles they can for the first time produce in quantity four transuranic elements discovered at the university — americium, curium, berkelium and californium.

They are also able, in transmuting elements, to jump over several numbers in the periodic table.

For instance they have turned gold, No. 79 in the periodic table, into astatine, No. 85.

NOT IN NATURE

The latter, an iodine-like substance not found in nature, is important as a medical research tool.

The work climaxes four years of effort to fire heavier atomic bullets in the radiation laboratory's sixty-inch cyclotron.

Atom smashers ordinarily fire the lightest of atomic particles — electrons or protons. The heaviest bullet used heretofore was helium, of atomic weight 4.

U.C. Cyclotron Steps Up Atomic Element Output

In the new work the scientists have been able to accelerate as bullets carbon 12 and carbon 13 to energies of 100 million electron volts.

HIGHER POINTS

These heavier projectiles splatter the target with a much larger clump of protons and neutrons. When most of them enter into an atom of the target and become a part of it, the target atom turns into a different element, several points higher in the periodic table.

Before the Berkeley scientists began shaking up Nature, the periodic table ended with uranium, Element No. 92.

By cyclotron bombardments the physicists found neptunium, No. 93, and then plutonium, No. 94, which was the explosive stuff of the Nagasaki atomic bombs.

Since the war the scientists have found the four new ones up to californium, No. 98.

STEP BY STEP

But the production of them is painfully slow because each of them must be built up step by step from uranium. Only microscopic amounts of the latest ones have been isolated.

Now, however, the scientists are bombarding uranium with carbon 12 and getting californium in quantities 100 times greater. That is a jump from Element No. 92 to Element No. 98.

There is speculation that the new method will enable them to create still heavier elements not found in nature.

Dr. Joseph G. Hamilton, director of the Crocker Laboratory of Medical Physics, was in charge of the research that made the heavier projectiles practicable.

Dr. Glenn T. Seaborg, co-discoverer of plutonium and others among the transuranic elements, directed that phase of the work.

Atomic Energy Valued Chiefly As Medical Aid

Wide Industrial Use Remote, Says Scientist

Although atomic energy will someday be available for widespread industrial use, its greatest value to humanity will rest in its uses as a tool of medical research, one of the country's leading atomic scientists declared last night in a University of Buffalo lecture.

Dr. Glenn T. Seaborg of the University of California Radiation Laboratory spoke in Norton Hall under auspices of the UB Chemistry Department's Foster Foundation.

Predicting that it would be "about two years" before a reactor could be built which would convert fissionable material to energy for industrial use, Dr. Seaborg said such an accomplishment would be only a beginning.

"At a wild guess I'd say it will take about ten years to construct an atomic energy producing plant of some importance," he said. "It would be several decades at least before an appreciable part of the world could be supplied with such energy."

"In the long run, the benefits which humanity will derive from the use of radioactive tracers in scientific investigation, particularly in medicine and biology, will exceed the benefits from industrial development of nuclear energy," he said.

Declaring it was "theoretically possible" to provide all the power the City of Buffalo would need for 24 hours from a pound of refined uranium, Dr. Seaborg then outlined obstacles which must be overcome before the theory could become fact.

Expense a Factor

"Although there is no need for further fundamental discoveries in the field of the atom, there remains a multitude of engineering problems," he said. He added that it was difficult to estimate whether, upon solution of those problems, atomic energy would prove less expensive than present sources of industrial power.

One of the problems cited was that of constructing a nuclear energy reactor, or machine, without using today's best known construction materials. Such materials, he said, are unsuitable for such a purpose because they absorb the neutrons essential to the power-producing process.

Stressing that "there will be a time when we will have nuclear energy on a usable scale," he listed other problems which must first be solved.

Controls Important

Among them was the problem of developing "foolproof controls" for regulating release of such energy and that of disposing of dangerously radioactive "ashes" from nuclear energy reactors.

The bulk of the shielding necessary to protect humans from the dangers of radioactivity would result in construction of atomic energy plants of such a size as to place serious limitations on the uses of the power, he said.

"For example, it is most unlikely that automobiles or locomotives could be operated by energy produced in such a fashion," he explained.

Dr. Seaborg will lecture daily through Friday at 4.30 p. m. in Foster Hall on the UB Campus on subjects connected with atomic fission and transmutation.

OAKLAND TRIBUNE 4/1/57

Alumnus of Year to Be Named At U.C. Charter Day Banquet

BERKELEY, March 10. — Another name will be added to the roster of outstanding University of California graduates on March 19 when the Alumni Association will name its 1950 "Alumnus of the Year."

The award will be made by

Maynard J. Toll, president of the association, at the formal Charter Day Banquet at the Palace Hotel, San Francisco. The honor will go to that graduate of the university whose accomplishments for 1950 have been judged most outstanding by a committee of the Cali-

fornia Alumni Council.

Previous award winners include Gen. James H. Doolittle, Class of 1922; Joseph Erlanger, Class of 1985, physiologist; President Robert Gordon Sproul, Class of 1913; Governor Earl Warren, Class of 1912; Monroe E. Deutsch, Class of 1902, former U.C. vice-president and Provost Emeritus; Glenn T. Seaborg, Class of 1934, atomic scientist, and J. D. Zellerbach, Class of 1913, chief of the

ECA mission to Italy in 1949.

The Charter Day Banquet will commemorate the 83rd anniversary of the university's founding. Speakers at the banquet will be: Lewis Douglas, former ambassador to Great Britain, Gov. Earl Warren and President Sproul.

Dr. Seaborg Believes A-Energy's Biggest Value Is in Medicine

BUFFALO E.V.E. NEWS 3/22

"The medical-atomic age has arrived," the 1951 co-recipient of the Nobel Prize in chemistry, Dr. Glenn T. Seaborg, 39, told a Buffalo Evening News reporter this morning in the Statler Hotel.

The lanky young chemist, who will read a paper before an American Chemical Society convention at the hotel next week, is the co-discoverer of plutonium and the four other transuranium elements found to date. He is a professor in the department of chemistry and the director of the Radiation Laboratory at the University of California.

Dr. Seaborg placed the medical uses of atomic energy ahead of its value as power for the present and said that "even in the long-range view, the uses of tracers in medicine, science and industry will probably bring greater benefits to mankind."

Though he described himself as a "basic" scientist, Dr. Seaborg explained that he was interested in atomic power as fuel.

"Atomic power probably has a place in industry, but it is not now foreseeable that it will supplant other sources. It will merely augment them," he said.

On the U. S. development of industrial atomic energy through the Atomic Energy Commission, he struck a note of mild impatience. "The program is going at a satisfactory rate, but it is still reasonable to hope that it were going faster." Caution in experimentation, he felt, slowed down advances.

Admitting there were difficulties in improving the program, he hoped there might be "a greater willingness to experiment with the construction of reactors before every conceivable problem has been solved."

Dr. Seaborg, referring again to atomic-energy power, revealed that the reactor proving grounds at Arco, Ida., had duplicated the "stunt" of British atomic scientists at Harwell by generating electrical power for a day or two in December 1951.

The boyish-looking scientist will appear on the University of Buffalo Round Table, discussing "Chemistry Looks to the Future," at 7:30 o'clock tonight on WBEN and WBEN-TV.

ATOM BY-PRODUCTS CALLED IMPORTANT AS AID TO HUMANITY

The radioactive by-products of atomic energy ultimately will benefit humanity more than its industrial uses, one of the nation's foremost atomic scientists predicted Monday evening.

Dr. Glenn T. Seaborg, University of California chemistry professor and a research member of the university's radiation laboratory explained that the reason for this is the "limitless potential" of radioactive tracers in studying the causes and treatment of diseases.

Dr. Seaborg addressed more than 300 persons in the University of Buffalo's Norton Hall under the auspices of the U. S. Chemistry Department's Foster Foundation.

He has discovered a number of radioactive isotopes, helped develop the plutonium manufacturing process and is on the Chemical

Advisory Committee for the Atomic Energy Commission's research director.

Sees Three-Stage Development

Although a "multitude" of engineering problems must be solved, Dr. Seaborg said that he believes these eventually can be overcome to make nuclear energy available for industrial power on a "workable scale."

The development of plants for the conversion of fissionable material into electrical energy will probably come in three stages, Dr. Seaborg said that the first will be the operation of a reactor on a strictly limited scale. He believes that the first can be built within about two years.

He estimated that ten years will be required to build a plant "of practical importance" to produce 100,000 kilowatts—roughly 20% of the power rate used to light a city the size of Buffalo.

It will be "some decades," Dr. Seaborg forecast, before "some appreciable fraction" of the nation's energy supply is developed from nuclear power.

Notes Engineering Problem

Whether that third stage ever is reached, he explained, depends upon intangible economic factors—if, for example, atomic power proves cheaper than present sources.

One of the chief engineering problems in building an atomic plant is to find new structural materials which can "slow down" the nuclear process. In this search, Dr. Seaborg noted, atomic scientists must rely on the aid of geologists and metallurgists.

Other problems listed by Dr. Seaborg are:

1—Finding a medium for carrying the heat energy from the plant—water may not prove suitable.

2—Development of "foolproof controls" of the fission process, actually one of the "easier problems."

3—The chemical processing of the "ashes" from the fission products.

4—A practical solution for the disposal of the fission products after the machine has operated for a considerable time. He said that underground "vats" used at Hanford, Wash., may not remain impervious to radioactive leakage indefinitely.

Observing that the huge shielding walls required for atomic plants greatly restrict the energy as a source of "mobile" power, Dr. Seaborg said that the energy will "probably never be used for automobiles and locomotives," but might propel aircraft or submarines on round-the-world trips.

He was introduced by Prof. Henry M. Woodburn, head of the U. S. Chemistry Department.

Four Alumni Are Awarded Commencement Citations; 2000 Students Graduate

Six distinguished Americans received honorary degrees and four outstanding alumni were awarded the Alumni Citation for Excellence at commencement exercises on June 8 in the University Arena.

For the first time, the honorary degree of doctor of public service was conferred by the University. Recipients were Ralph J. Bunche, Nobel prize winner and director of the department of trusteeship of the United Nations; Fleet Admiral Chester W. Nimitz, Pacific commander during World War II, and Charles C. Gates, Denver industrialist and philanthropist, who for many years was a University trustee.

An honorary degree of doctor of divinity was conferred on the Rt. Rev. Harold L. Bowen, Episcopal bishop of the diocese of Colorado, and Judge Orie L. Phillips of the U. S. Court of Appeals received an honorary degree of doctor of laws. Dr. Glenn T. Seaborg of the University of California, research chemist who shared in the discovery of plutonium and who recently discovered four new elements as a result of his radioactive studies, received an honorary doctor of science degree.

The newly established Alumni Citation was awarded to: Mary S. Buchtel, A.B. '20, executive secretary of the San Francisco Y.W.C.A. and daughter of the late Chancellor Henry A. Buchtel; Lewis A. Dick, LL.B. '16, Denver attorney and civic leader; Francis S. Van Derbur, A.B. '29, Denver businessman and civic leader, and Wayne C. Williams, LL.B. '06, Denver lawyer, author and historian.

More than 1,900 graduates received their degrees from Chancellor Jacobs at the exercises before about 6,500 faculty members, parents and friends. Members of the Army and Air ROTC groups received military commissions during the ceremony.

PIONEER

Jacobs Exhorts DU Graduates to Shun Weakness

Rocky Mtn. News

6/9/51



Chancellor Albert C. Jacobs, left, presents the honorary degree of doctor of laws to Bishop Harold Bowen of the Colorado Episcopal diocese at Denver University's 87th commencement exercises last night.

—Rocky Mountain News Photo.

Chancellor Albert C. Jacobs last night told the 1900 members of Denver University's 87th graduating class to begin their adult lives armed against weaknesses of intellect, morals and politics.

In a speech entitled "A Time of Mists and Shadows," the chancellor asked that we as Americans make a better example of democracy; ethics and morality than we have in the past.

"In a spirit of gravity and optimism," he said, "I say that the future of mankind is dependent upon your intellectual, moral and spiritual leadership.

"Insure that the path of human progress will be marked by the heart and the will of a free people and not by a government edict. Eradicate falsity in both public and private affairs—for there can be no lasting integrity without honesty in both government and business," he added.

HITS POLITICAL LAXITY

For the second time in a month, the chancellor berated current political dishonesty and laxness brought out by the Kefauver probe. For the second time he referred to a "lack of dignity and responsibility on the part of the holders of high public office." This was interpreted as critical of

President Truman's bickering with critics by mail.

"In an hour when domestic and international criminality obscures our vision," he said, "restore our ideals of justice and decency as well as the spirit of compassion basic in religion.

"Participate in the restoration of our standards and ideals thereby leading in the rebirth of freedom. We of an older generation must follow your leadership," he said.

DEGREES HONOR THREE

The impressive ceremony saw three new degrees conferred for the first time for distinguished public service.

These went to Chester W. Nimitz, retired fleet admiral and Pacific hero; Dr. Ralph Bunche, United Nations negotiator and winner of the Nobel peace prize; and Charles C. Gates, Denver industrialist.

Three other degrees went to Bishop Harold L. Bowen of the Colorado Episcopal diocese, doctor of divinity; Circuit Judge Orle L. Phillips, doctor of law, and Glenn T. Seaborg, distinguished scientist, doctor of science.

Alumni awards were given to Mary S. Buchtel, daughter of a former chancellor; Lewis A. Dick, Denver attorney; Francis S. Van Derbur, Denver businessman, and Wayne C. Williams, Denver attorney and historian.



Glenn T. Seaborg
Chemical Post 11/4/47

Dr. Glenn T. Seaborg, professor of chemistry at the University of California, Berkeley, and one of America's leading nuclear chemists, has been elected chairman of the American Chemical Society's Division of Physical and Inorganic Chemistry for 1952.

Seaborg is co-discoverer of the atomic fuel, plutonium.

At the present time he is doing research on the trans-uranium elements and on the identification of various high-energy nuclear products of the University of California's 184-inch cyclotron.



Dr. Edwin M. McMillan (top) and Dr. Glenn T. Seaborg, University of California professors, are expected to win the 1951 Nobel Prizes in chemistry.

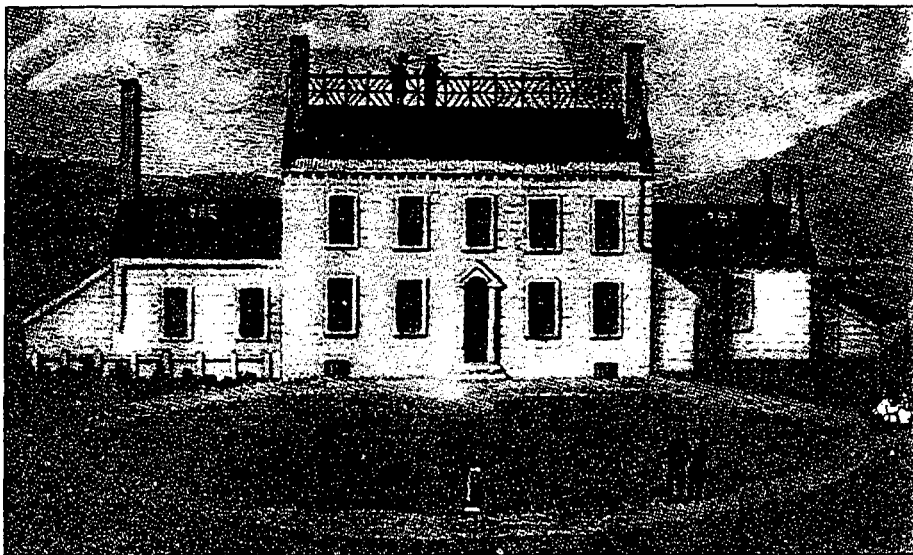
DENVER POST

National and Civic Leaders Awarded Degrees ^{6/7/57}



Denver Post Photos by Albert Moldvay.

Chancellor Albert C. Jacobs (front, left) of the University of Denver stands with six outstanding Americans awarded honorary degrees during the university's commencement exercises in the Hilltop Arena Friday night. The recipients of the degrees and the degree received include (left to right, front row) Fleet Adm. Chester W. Nimitz, doctor of public service; Circuit Judge Orie L. Phillips, doctor of law, and Dr. Ralph J. Bunche, doctor of public service, and (back row) Charles C. Gates, doctor of public service; Glenn T. Seaborg, doctor of science, and Bishop Harold L. Bowen, doctor of divinity. The university graduated more than 1,900 Friday night.



Joseph Priestley, Nonconformist, and his Pennsylvania home, shrine of American chemistry

Chemists and the World Ahead

That was the summer when Americans had no instant coffee, stainless steel, kiss-proof lipstick, Fiberglas lampshades, dry ice, rayon panties, frozen spinach, pocket lighters, penicillin, plastic shower curtains, underarm deodorants, insulin, foam rubber, cola drinks, aluminum saucepans, nylon stockings, DDT, unbreakable watch crystals, painless dentistry, synthetic fertilizers, home permanent waves, anti-freeze, or bubble gum. That was also the summer when the infant Herbert Hoover yelled fretfully at the sullen heat in West Branch, Iowa.

But on Aug. 1 of that year, 1874, more than 100 chemists, resplendent in baggy suits, billowing whiskers, and bushy sideburns, made a pilgrimage to a two-story frame house in Northumberland, Pa. There at the home of Joseph Priestley, they noted the 100th anniversary of Priestley's great achievement: the discovery of oxygen.*

Small Beginning: At that meeting the chemists decided to form a professional society. And in 1876 in New York the American Chemical Society was born, with 133 members. Last week, 75 years later and 67,000 members larger, the ACS, now the world's largest scientific alliance, held a diamond-jubilee meeting in New York. Looking back, the chemists had much to boast about.

For its first two or three decades, the society was no whopping success, but neither were its members, though most

were talented scientists. Through the '90s, chemists came in two styles: scholars who taught stuffy courses in a few colleges, and technicians who plodded through analyses in factories. Chemistry offered almost none of the prestige and social eminence of other professions. Until 1890 the fewer than 300 members still held all their meetings in New York. In 1893 they met in Chicago; 182 attended.

Not until the first world war did American chemistry, and with it the ACS, blossom. Dyestuffs and other chemicals supplied by Germany were suddenly choked off by the Allied blockade. Under pressure, a native chemical industry shot up. After the war, the society had more than 15,000 members.

The second world war again caused seam-bursting growth in the chemical industries, featuring the synthetic-rubber program, explosives, and aviation gasoline. In 1945, 43,000 belonged to the ACS. Since the last world war, the society has grown even faster. Today, next to its 67,000, the memberships of all other scientific societies seem puny. A few comparative figures: American Physical Society, 10,000; American Mathematical Society, 4,500; American Society of Mechanical Engineers, 36,000; American Psychological Association, 8,500.

Something for Everybody: The strength of the ACS lies in what it offers its members, 25 per cent of whom are chemical engineers, 25 per cent students and professors, the rest being consultants or employed by government or industry. They can attend meetings sponsored by twenty professional divisions (e.g., Medicinal Chemistry, Agricultural and Food Chemistry, Colloid Chemistry, or Petroleum Chemistry). Local sections (139 of

them, scattered through every state but Arizona, and through Hawaii and Puerto Rico) get together frequently to hear lectures by the country's top chemists.

The society publishes chemistry's definitive periodicals. In one, *Chemical Abstracts*, each year some 60,000 scientific papers in all languages are boiled down and evaluated by experts in every field of chemistry. In this way, *Chemical Abstracts* summarizes (and painstakingly cross-indexes for reference) the best current chemical research throughout the world. Without this journal no chemist could keep up with even his own field.

Another unique ACS publication is *Chemical & Engineering News*, a slickly edited weekly magazine with a circulation topping 73,000.

Big Business: Besides its meetings and publications, the society runs a free employment service for the benefit of members and the chemical industry. A press and radio service, the ACS News Service, is tops in the scientific field; it funnels news to the public and gets the stories straight. These and minor activities make the ACS a big business. Its annual budget exceeds \$3,000,000, which comes from dues and from the advertising-jammed journals. Thus the society could swing considerable weight in Washington. But although Congressional committees frequently consult ACS leaders on such matters as draft deferment for scientists, the society bends over backward to avoid being accused of active lobbying.

Last week's meeting was the biggest in the history of the society and by far the most colorful. At morning and afternoon sessions, 15,000 chemists read or heard 800 technical reports. Hundreds strolled through an exhibition of paintings by chemists, which was hung in the Statler headquarters hotel. The Post Office Department issued a special ACS

*An Englishman, a Nonconformist minister, and an amateur scientist, Priestley made oxygen in his wife's silver ladle by focusing sunlight with a magnifying glass on a few pinches of red oxide of mercury. In 1791 a mob, incited by his ardent support of the American and French Revolutions, burned his home in Fairhill, England. Three years later he emigrated to Northumberland and there founded America's first Unitarian congregation.

stamp. Department store windows, railroad terminals, and hotel lobbies were dotted with chemical exhibits. And on Wednesday night, 2,731 chemists and their wives gathered at the Waldorf-Astoria for a \$10-a-plate banquet (including crayfish bisque, roast beef, and brandied dates over ice cream). After dinner, opera star Risé Stevens sang and Vice President Alben Barkley, among others, spoke. On a floodlit dais sat five tiers of chemists representing 42 foreign nations (none from behind the Iron Curtain, although several were invited).

The week was one for recollections and for predictions more daring than scientists usually essay. In a ceremonial speech, chemist James Bryant Conant, president of Harvard, gazed into his crystal ball—"a plastic one, as befits a chemical age"—and saw "neither an atomic holocaust nor the golden abundance of an atomic age." His vision was of unlimited energy from harnessed sunlight; deserts blooming, thanks to sun-distilled ocean water; and by 1961 an "anti-fertility" pill to control runaway birthrates. Atomic power, he forecast, would be abandoned when nations, surviving a period of uneasy peace, agreed that atomic energy was too nasty and dangerous a toy for volatile man.

During the meeting, NEWSWEEK reporters buttonholed other leading chemists and asked what they saw for the future. Some of the men and their predictions were:

N. Howell Furman, Princeton professor and this year's president of the ACS: Man will get his energy from the sun or the atom, thus freeing coal for use as a chemical raw material. A compact and efficient photosynthesis process for manufacturing green plants for food would be the chemist's greatest contribution.

Paul Aebersold, chief of the Atomic Energy Commission's Isotope Division: Isotopes will soon be as common in industrial and medical research laboratories as microscopes are today. Only 15 to 20 per cent of chemists now use isotopes. Inertia, ignorance of techniques, and lack of apparatus are all that is holding up the rest. Industrial men will soon be choosing a staff member and telling him: "Look, you're a bright young man. Take a year off and become our atomic energy expert." The future is bright for atom-generated power. "Experience shows that reactors always run better than expected."

Asger Funder Langlykke, research director for E.R. Squibb & Sons: All alcohol will be made synthetically, instead of by fermenting fruits and vegetables. The country's fermentation factories will concentrate on penicillin, citric acid, and other medicinal and industrial products.

Milton Harris, head of Harris Research Laboratories, Washington, D.C., who pioneered in home permanents and shrink-resistant wool socks: Longer-wearing,

more comfortable clothing will soon be made from blended fabrics (e.g., nylon and wool). Annual production of synthetic fibers will rise to billions of pounds by the end of the century. "With the rapidly rising cost of production . . . it may eventually be cheaper to manufacture all fibers than raise them naturally."

Herman F. Mark, professor at the Polytechnic Institute of Brooklyn and leading authority on quantum mechanics and polymers (materials like plastics): "In the next few years, we should have plastics which do not burn, are lighter,



Newsweek—Ed Wertzel

President Furman, seer Conant

stronger, and less expensive to produce than metals." Looking farther into the future, proteins and cellulose may be made synthetically.

Linus Pauling, head of chemistry and chemical engineering at the California Institute of Technology and one of chemistry's most brilliant and versatile theorists: Within five years will come a pretty complete understanding of how drugs and proteins and enzymes act and interact. Twenty-five years later, proteins and protein substitutes, enzymes and hormones will be manufactured for medical and industrial use. Then the chemist will be ready to plan theoretically perfect drugs designed to combat specific bacteria and viruses. A comprehensive theory of valence forces, which hold together atoms and molecules, may revolutionize metallurgy less than a decade from now. To find the right alloy, the metallurgist will no longer have to mix and test hundreds or thousands of alloys. From theory, he will be able to calculate in advance the toughness, hardness, rustlessness, etc., of any conceivable blend of metals.

Glenn T. Seaborg, professor at the University of California and co-discoverer of plutonium (the A-bomb fuel) and four of the five other heavier-than-uranium elements: It should be possible, though increasingly difficult, to make more super-

heavy artificial elements. In nuclear chemistry, for years to come, there will be more jobs than trained scientists to fill them.

Roger J. Williams, University of Texas biochemistry professor: Alcoholism may be licked within a decade. The cure will be diet or hormones designed to correct what is wrong in the alcoholic's body chemistry. A long-range hope is that biochemists will learn enough about the human body in action to use the same sort of approach to multiple sclerosis, cirrhosis, mental diseases, and other still mysterious ailments.

Melvin Calvin, University of California biochemistry professor: When chemists learn the chemistry of photosynthesis, they will be able to bypass vegetable growth and make plantlike materials synthetically. Meanwhile, probably in two or three years, algae or other tiny plants will be manufactured commercially by a sort of biological synthesis. And in less than 25 years, chemists will find an efficient way to harness solar energy.

Leon Sweet, research director for Parke, Davis & Co.: Within five years new antibiotics will be found which will tackle many of the germs that are now immune to the wonder drugs. Before the end of the century "important progress will have been made in the discovery of drugs to cure cancer, mental disorders, and diseases of the heart and arteries. The net result will be to lengthen the life span and create more problems for the social scientist. But the social scientist will have an easier time of it, since he will be dealing with sounder bodies and minds."

Richard O. Roblin, director of the chemotherapy (chemical drug) division of the American Cyanamid Co.: "In the near future better drugs for tuberculosis. Streptomycin was a step in the right direction, but its drawbacks are going to be ironed out." There is also "a very good chance" that drugs to control high blood pressure will be discovered in the next few years. In the long run the emphasis will be on preventing disease, not curing it. Maybe all cancer will be brought under control; "it probably won't be done by any one drug, but by many agents, if it is done at all."

Charles Allen Thomas, president of the Monsanto Chemical Co. and chairman of the American Chemical Society's board of directors: Chemical industry in the United States will continue to grow, but not so rapidly as it has in the last few years. "The big bottleneck now, and the bottleneck of the future, is and will be manpower." The government is increasing its research staff by 5,000 per cent and private industry is boosting research by several hundred per cent. "The major advances of the future will occur in the field of body chemistry. People will be healthier and, therefore, happier."

A-Bomb Heavy Metal Actually Very Light

CHICAGO — A heavy metal that is much lighter than expected has come to light with the metallic isolation of the universe's 95th element, americium, announced here to the American Chemical Society by Dr. Edgar F. Westrum of the University of Michigan.

PLUTONIUM, the modern A-bomb element, is number 94 and heaviest substance among the 98 elements known. Americium, just obtained in its silvery metallic form, has only about half its parent's density.

This means that even though americium's atomic weight is greater than that of plutonium, two bricks of americium would be necessary to counterbalance one of equal size made of plutonium. This is because inner forces give the americium atom a more expanded structure.

At least five new chemical elements beyond californium, number 98, will be discovered in the future, Dr. Glenn T. Seaborg, University of Califor-

nia Nobelist and plutonium's discoverer, predicted in an interview here.

He is able to predict the chemical properties of the rest of what is called the actinide series, which ends with the element 103 whose atomic weight will be 267. Elements beyond 95 may be lighter than plutonium and uranium, if the tendency toward lower density shown by americium continues.

Only 5,000 atoms of the most recently discovered element, californium, existed, Dr. Seaborg said, and future new elements manufactured out of transuranium elements will be even rarer.

IT IS NOT KNOWN whether this process of synthetic building of elements duplicates ancient elements, long extinct, that once existed on earth or whether man has now gone nature one better and made material that has hitherto been impossible.

ST. PETERSBURG, FLA.

SEP 24 1950

Chemists Pick

Dr. Seaborg

BERK. GAZETTE 11/15/51
Dr. Glenn T. Seaborg, distinguished University of California nuclear chemist, has been elected chairman of the American Chemical Society's division of physical and inorganic chemistry for 1952, it was announced today.

The new chairman, a graduate of UCLA and a PhD degree-holder from UC here, is co-discoverer of the atomic fuel plutonium and of the four other transuranium elements found to date—americium, curium, berkelium and californium.

At the same time, rumors from Swedish sources indicated that Dr. Seaborg may be awarded the 1951 Nobel Prize in chemistry. This year's winner is to be announced Nov. 15.

In 1947 the atomic scientist was named one of America's 10 outstanding young men and was the recipient of a \$1000 American Chemical Society award in pure chemistry. The year previous he was appointed to the general advisory committee of the Atomic Energy Commission.

He is now engaged in research work on the transuranium elements and on identification of various high energy nuclear products formed during the operation of the UC 184-inch cyclotron.

The 38-year-old scientist first joined UC as a research associate in 1937. He received his professorship in 1945.

NOBEL PRIZE TO SEABORG SEEN

S.F. EXAM. 11/2/51

Persistent rumors had it yesterday that the Nobel Prize in chemistry will be awarded this year to Dr. Glenn T. Seaborg, famed atomic scientist at the University of California.

The reports came from usually reliable Swedish sources close to the Nobel Committee in Stockholm.

The 1951 winners in the fields of chemistry, physics and literature are to be announced November 15, but the recipients are usually notified in advance.

Seaborg's associates in the UC radiation laboratory said he was "always a possibility" for the prize.

"He has been recommended every year for several years," one of his fellows chemists added.

Seaborg, 38, is a professor of chemistry at UC, long noted for his achievements in nuclear research.

He is co-discoverer of the atomic fuel, plutonium, and co-discoverer of the four other transuranium elements found to date—americium, curium, berkelium and californium.

Seaborg has received many other awards from various scientific and chemical societies.

Jour. of Commerce
Name Dr. Seaborg ACS
Physical, Inorganic Head

11/7/51
Dr. Glenn T. Seaborg, professor of chemistry at the University of California and one of America's leading nuclear chemists, has been elected chairman of the American Chemical Society's division of physical and inorganic chemistry for 1952. Dr. Seaborg succeeds Prof. Milton Burton of the University of Notre Dame.

Dr. Franklin A. Long, professor of physical chemistry at Cornell University, was chosen chairman-elect and Prof. Joseph W. Kennedy of Washington University, St. Louis, was named secretary-treasurer.

Dr. Seaborg, the new chairman, is co-discoverer of the atomic fuel plutonium and of the four other

ISHPEMING, MICH

IRON ORE

11/6/51

Seaborg, Nuclear Chemist Honored In Profession

Dr. Glenn T. Seaborg, a former Ishpeming resident who is one of America's leading nuclear chemists, has been elected chairman of the American Chemical Society's Division of Physical and Inorganic Chemistry for 1952.

Dr. Seaborg, the new chairman, is co-discoverer of the atomic fuel plutonium and of the four other transuranium elements found to date—americium, curium, berkelium and californium. He is also co-discoverer of several artificial radioactive isotopes, including fissionable plutonium, a new fissionable isotope of uranium, a long-lived isotope of neptunium and other members of the neptunium radioactive series.

During World War II, Dr. Seaborg was granted a leave of absence from the University of California to engage in atomic research at the Metallurgical Laboratory of the University of Chicago.

Dr. Seaborg was named "Chemist of the Year" for 1946 in a poll conducted by the magazine Chemical and Engineering News. He won the Distinguished Service Award for 1945 given by the

Chicago Junior Association of Commerce and was named one of America's "ten outstanding young men" for 1947 by the United States Junior Chamber of Commerce. In 1947, Dr. Seaborg received the \$1,000 American Chemical Society Award in Pure Chemistry. The following year, he won the William H. Nichols Medal given by the Society's New York Section. The American Society of Swedish Engineers awarded him the John Erickson Gold Medal in 1948. Dr. Seaborg also was presented with the California Alumni award for 1948.

In 1946 President Truman appointed Dr. Seaborg to the general advisory committee of the Atomic Energy Commission. He has been a member since 1947 of various National Research Council committees dealing with radioactivity and nuclear National Research Council committees dealing with radioactivity and nuclear studies. Dr. Seaborg also has been since 1946 a member of the joint commission on standards, units and constants of radioactivity of the International Council of Scientific Unions.

He was elected a member of the National Academy of Sciences in 1948 and a foreign member of the Royal Swedish Academy of Engineering Sciences in 1949, and was chosen a Fellow of the Royal Academy of Arts (London) in 1951.

Dr. Seaborg is the author of some 120 technical papers which have appeared in many scientific journals. He was associate editor of the Journal of Chemical Physics from 1948 to 1950. At present, he is a member of the editorial board of the Journal Of The American Chemical Society.

Born in Ishpeming, Mich., in 1912, Dr. Seaborg was graduated from the University of California at Los Angeles in 1934. He received the Ph. D. degree from the University of California at Berkeley in 1937 and the honorary D. Sc. degree from the University of Denver in 1951. He joined the faculty of the University of California in 1937 as a research associate in the college of chemistry. He was promoted to instructor in 1939, associate professor in 1941 and professor in 1945.

In addition to the organizations,

transuranium elements found to date—americium, curium, berkelium and californium. He is also co-discoverer of several artificial radioactive isotopes, including fissionable plutonium (Pu239), a new fissionable isotope of uranium (U233), a long-lived isotope of neptunium (Np237) and other members of the neptunium radioactive series.

NOV 5 - 1951

Seaborg to Head ACS Physical Chemistry Div.

Dr. Glenn T. Seaborg, professor of chemistry at the University of California, has been elected chairman of the American Chemical Society's division of physical and inorganic chemistry for 1952. Dr. Seaborg succeeds Professor Milton Burton of the University of Notre Dame.

Dr. Franklin A. Long, professor of physical chemistry at Cornell University, has been chosen chairman-elect and Professor Joseph W. Kennedy of Washington University, St. Louis, has been named secretary-treasurer.

Nobel Winners To Visit Sweden

What happens when two shy scientists learn they have been awarded a Nobel Prize, the highest goal to which any one in their field can aspire?

They blush and stammer and utter all the old cliches, even as lesser men.

"I'm very happy," Edwin McMillan told a "news conference" in Berkeley. "Any more words would be superfluous."

"I'm very proud and pleased," Glenn Seaborg added.

And that was about it.

Yes, both would go to Sweden to accept the joint prize from the hand of the king; both would take their wives.

Beyond that neither had any idea what he would do with his half of the tax-free \$32,000 that goes with the prize.

More words apparently being really superfluous, newsmen left the two in the hands of congratulating colleagues, including two earlier Nobel laureates, Ernest O. Lawrence and William E. Giaque.

Two Scientists At U.C. Given Nobel Prize

BERKELEY, Nov. 15.—University of California professors Glenn T. Seaborg and Edwin M. McMillan, two of America's top scientists, today were awarded the 1951 Nobel Prize for chemistry.

The Royal Swedish Academy of Science voted the awards for their work in nuclear research at a meeting in Stockholm, according to the United Press.

Choice of the two scientists for the prize boosts the total of Nobel winners on the University campus to six.

The pair will share prize money of 167,612 Swedish Crowns or about \$32,357, from a trust fund established by the inventor of dynamite, the late Alfred Nobel.

Seaborg is the discoverer of five new elements of matter, including plutonium, the substance which destroyed Nagasaki. McMillan, through his earlier discovery of the element Neptunium, paved the way for Seaborg's discovery.

Seaborg is responsible for the discovery of four of the six elements made artificially by the University's cyclotron laboratories.

Until 1940, artificially produced elements were not known. Before then, all the known elements were naturally produced.

Continued Page 9, Col. 1

Two U.C. Atom Scientists Are Awarded Nobel Prize

Continued From Page 1

such as gold, oxygen, sodium and iron. The total of these natural elements made up the chemical periodic table and ended with element 92.

During that year, however, Dr. McMillan and P. H. Abelson of the University, bombarded uranium, a natural element, with neutrons and produced neptunium, element 93.

Again that same year the periodic table grew with the discovery by Seaborg, McMillan and associates of plutonium, element 94. This element is the chief explosive agent of the atomic bomb.

In 1944, element 95, or ameri-



cium, was produced by Dr. Seaborg and associates. The same year, Seaborg and associates discovered element 96, curium.

In 1950, the 39-year-old scientist discovered berkelium or element 97, and californium, element 98.

A University of California graduate, Dr. Seaborg lives at 1154 Glen Avenue, with his wife Helen, and four children.

Forty-four-year-old McMillan, recipient of many of the Nation's top scientific honors, is widely known as co-discoverer of neptunium, the first of the transuranium elements; and of plutonium, the atomic bomb element.

In 1945, he developed independently the "theory of phase stability," which has made possible the development of multi-million and multi-billion volt atom smashers, including the synchrotrons, synchrocyclotrons and the bevatron.

During World War II, the physicist contributed to the evolution of radar and underwater sound devices for submarine development and was active in the Manhattan Engineer District atomic project.

McMillan's theory of phase stability has made it possible for scientists to create man-made cosmic rays.

Under his guidance on the 184-inch cyclotron, mesons, a mysterious atomic particle, were made for the first time in a laboratory.

A graduate of the California Institute of Technology, he lives at 265 Lake Drive, with his wife, Elsie, and their three children.



Dr. Edwin M. McMillan (top) and Dr. Glenn T. Seaborg, University of California professors, have been awarded the 1951 Nobel prize in chemistry.

Two Atomic Pioneers Receive Physics Award

STOCKHOLM, Nov. 15. — (AP) — Two pioneers in British atomic research today were awarded jointly the 1951 Nobel Prize for physics.

They are Sir John Cockcroft, the British Government's top atomic scientist, and Prof. E. T. S. Walton of Dublin's Trinity College. They were the first to split atomic nuclei with artificially boosted high tensions—a 1932 experiment which helped pave the way for the atomic age.

The team will divide an award of 167,612 Swedish crowns (about \$32,357). The money comes from a trust fund established by the late Alfred Nobel, Swedish inventor of dynamite.

Earlier today the 1951 Nobel Prize for literature was awarded to Par Lagerkvist, 60, author of the current best seller "Barabbas," and "The Dwarf." He will receive a check for 167,612 crowns (\$32,357).

He and the other prize winners will receive their money in special ceremonies in Stockholm on December 10. King Gustaf VI



Sir John Cockcroft (left) and Prof. E. T. S. Walton are the joint winners of the 1951 Nobel Prize in physics. They were the first to split the nucleus of the atom with powerful electrical charges.—AP Wirephotos.

Par Lagerkvist, Nobel Prize winner in literature.

will present the awards.

Cockcroft and Walton were first associated in experimental work in the late 1920's in the famed Cambridge University laboratory for radio-activity and atomic research headed by Lord Rutherford, the first man to transform an element by radioactive atomic bombardment.

After three years of work, Cockcroft and Walton built an accelerator, forerunner of the modern cyclotron. With it they bombarded helium with protons speeded by charges of 900,000 volts.

According to classical physical theories, this voltage should have been quite inadequate to shatter the strong electrical wall surrounding the atom's nucleus. The two scientists, however, pierced the wall with their charge and split the helium atoms into lith-

ium and hydrogen, opening the road to the atomic age.

The selection of Lagerkvist for this year's literature prize was not unexpected here. He was mentioned among contenders in 1949 and again in 1950, running second to American Novelist William Faulkner in the academy's balloting in the latter year.

In choosing Lagerkvist, the academy, of which he has been a member since 1940, clearly followed the wishes of the donor of the prize, Alfred Nobel. Nobel stipulated that the writing of prize winners should have "an idealistic tendency."

The academy announcement said: "For the artistic force and deep independence by which he in his writing tries to find an answer to the eternal problems of mankind, the academy has decided to award the Nobel

prize for literature to Par Lagerkvist."

Although Lagerkvist has written more than 30 books since he published his first work in 1912, he was little known outside Scandinavia until the appearance of his novel of the renaissance, "The Dwarf," in 1944. It appeared in translation in the U.S. in 1945.

In 1950, he reached the ranks of international bestsellers with "Barabbas," a novel about the thief saved from crucifixion when the Jews chose to have him released instead of Jesus. This novel was translated into 11 languages within a year of its publication in Sweden and was published in America last month.

Three Nobel Prizes

Besides UC Winners, Awards Go to Englishman, Irishman and Swede

STOCKHOLM, Nov. 15 (AP)—Four scientists who are architects of the atomic age and an author whose best seller novel is laid in the time of Christ won 1951 Nobel prizes today.

The chemistry prize was shared by two Americans—Dr. Glenn T. Seaborg and Dr. Edward M. McMillan, both of the University of California at Berkeley. (See Page 1.)

A Briton and an Irishman shared the prize for physics. They are Sir John Cockcroft, director of Britain's "Atomic City" at Harwell, and Professor E. T. S. Walton of Dublin's Trinity College. They won the prize for their work as a team in 1932, when their experience in splitting atomic nuclei helped pave the way for the present status of atomic affairs.

Par Lagerkvist, a Swedish author whose "Barabbas" is high on best-seller lists in the United States, won the literary prize. He is a poet, essayist and philosopher as well as novelist.

His novel tells what happens to Barabbas, the ruffian, after Jesus took his place on the cross.

CASH AWARDS

The cash value of the prize in each field is 167,612 Swedish crowns, about \$32,357. In the case of joint awards, the money is split 50-50. King Gustaf VI will hand out the checks at ceremonies in Stockholm, December 10.

Leon Jouhoux, the French anti-Communist labor leader who won this year's Nobel Peace Prize, and Dr. Max Theiler of New York, a South American who won the prize for medicine for developing the first effective vaccines against yellow fever, will get their awards that night, too.

The Swedish Academy of Science honored the four scientists, while the Swedish Academy of Literature named one of its own members in Lagerkvist, a 60-year-old poet, essayist and philosopher as well as a novelist.

The money for the prizes comes from a \$9,000,000 trust fund left by Alfred Nobel, the Swedish inventor of dynamite. He died in 1896. The first awards were made in 1901. The prestige that goes with the prize far outstrips the monetary reward.

TRIBUTE TO PHYSICISTS

In awarding the prize for physics, the academy paid tribute to Cockcroft and Walton for their "pioneer work on the transmutation of atomic nuclei by artificially accelerated atomic particles."



Sir John Cockcroft E. T. S. Walton



NOBEL LAUREATES—Among scientists who congratulated Glenn T. Seaborg and Edwin McMillan yesterday for winning the Nobel chemistry prize were two for-

Walton, notified of the award, said it came as the "greatest surprise to him." When he was working with Cockcroft, fellow scientists were expressing concern over whether it would be safe to put the destructive powers of atomic energy in man's hands.

Walton, taking note of developments since then, said today: "The atom bomb certainly could have been developed without the work we did, but our experiments did open up a new field."

Since 1946 he has been a professor of natural and experimental philosophy at Trinity College.

Cockcroft and Walton built an accelerator, forerunner of the modern cyclotron. With this they were able to split helium atoms into lithium and hydrogen.

mer UC Nobel winners on the UC faculty, Ernest O. Lawrence (left) and William F. Giauque (right).

As Britain's most consulted physicist, Cockcroft was made head of Britain's air defense research establishment in 1939. He designed the general control interception radar apparatus used to track German bombers.

In 1940, he told his government the atom bomb was possible.

He went to Canada in 1944 as director of that nation's atomic energy project. In 1946 he returned to Britain to set up the Harwell project—a post he will leave next March to become Britain's top adviser in scientific research.

French President

PARIS, Nov. 15 (AP)—French President Auriol announced today he is not going to run for re-election in 1954.

UC's Two New Nobel Prizewinners ---The Men and Their Achievements

Dr. Seaborg

Dr. Glenn Seaborg, one of the University of California's two new Nobel laureates, has been referred to as the "alchemist of the atomic age."

The 39-year-old chemist so far has not made gold out of dross, but research teams headed by Seaborg have created five new elements out of old ones.

Through his nuclear transmutation he has discovered plutonium 94, americium 95, curium 96, berkelium 97 and californium 98—all elements adding immeasurably to man's knowledge of matter.

Not alone has Seaborg discovered and identified these new elements, but he has been able to develop techniques indicating how these elements would act if produced in large quantities.

HANDY WITH TOOLS

The tall, almost Lincoln-esque, scientist, whose professional life is dedicated to nuclear research, is as handy with a spade, a hammer or a trowel as he is with the University of California's giant cyclotron.

The Seaborgs are parents of four children—Peter, 5; Lynne, 4; David, 2; and Stephen, 3 months.

They moved into a new home at 1154 Glen road, Lafayette, last summer. There Seaborg currently spends his spare time landscaping with bricks, trowel, and shovel.

Seaborg, whose parents are of Swedish ancestry, was born in Ishpeming, Mich., a small mining town, on April 19, 1912. He was 10 years of age when his family moved to Southern California, and as a boy he worked at everything, from picking apricots in the San Joaquin valley to cleaning and oiling linotype machines.

WORKED AS STEVEDORE

He was graduated from high school in 1929—as valedictorian of his class—and went on to UCLA. To finance his college education he worked as a stevedore and yet was

elected to Phi Beta Kappa while in his junior year.

After his graduation he transferred to the University of California at Berkeley where he earned his Ph.D. and there he has been ever since except for a four-year leave of absence when he worked on the Manhattan Project during the war.

As full professor of chemistry at UC, Seaborg has been honored repeatedly by lay and scientific groups alike.

EMERGENCY OBSTETRICIAN

A shaggy, friendly man, he astonished friends and colleagues two years ago by announcing that he had delivered his third baby.

The doctor was late, he explained, and the baby was early and with no knowledge whatsoever of medicine he managed to do an expert job.

Mrs. Seaborg at one time was secretary to another Nobel laureate, Dr. Ernest O. Lawrence.

Dr. McMillan

Dr. Edwin M. McMillan made a mild announcement one day in 1949 to the American Physical Society.

"You all know," he said, "that we've been building a 300,000,000 electron-volt synchrotron. Well, it is operating.

In those few words, McMillan announced the crossing of another threshold down the long corridor of sub-atomic research. It was a crossing into further understanding of particles that no one has seen, of the basic ingredients of which matter is made.

The synchrotron was McMillan's creation, far more powerful than the cyclotron and far more complicated.

Yesterday he was awarded the Nobel prize for chemistry for another discovery, in which he did the pioneering work and which Dr. Glenn T. Seaborg of the University of California carried to conclusion. This was the identification of the

element Plutonium and the description of its fissionable nature.

McMillan, who is 44 and a professor of physics at UC, is a man for whom the romance of the physical world has long been of dominant interest.

He was a boyhood tinkerer with high-frequency coils, a young scientist who attended lectures at California Institute of Technology before he was even out of high school.

He took his Bachelor of Science degree at Cal Tech in 1928, his master's degree there in 1929, and his Ph.D. in 1932 at Princeton.

This quiet and modest Nobel laureate has few hobbies outside his work. He collects rock specimens out of scientific curiosity; he repairs gadgets at his home at 150 Purdue avenue, Berkeley, and repairs them with the deftness of the true technician. He climbs mountains—including Mt. Whitney and the Matterhorn—his one concession to sport.

HIS FAMILY

Dr. McMillan is married to the former Elsie Blumer, daughter of Dr. George Blumer, retired dean of the Yale University of Medicine, and a sister-in-law of Dr. Ernest O. Lawrence, another UC Nobel laureate.

The McMillans have three children—Ann, 8; David, 6; and Stephen, 1.

The Nobel physicist has been on the UC faculty since 1932, and during the war took a five-year leave of absence to devote his scientific genius to the war effort.

He directed field tests of pioneer microwave radar installations in the United States, organized an underwater sound equipment project for the Navy, and in 1942 went to Los Alamos to work with Professor J. Robert Oppenheimer on the atomic bomb. He returned to Berkeley in 1945.

McMillan preceded his work on plutonium by discovering the element neptunium—the first element to be found that is heavier than uranium.

UC Atom Experts Win Nobel Prize

HONORS FOR M'MILLAN, SEABORG

STOCKHOLM, Nov. 15 (AP).—Four leading atomic pioneers—two Americans, a Briton and an Irishman—today were awarded the 1951 Nobel prizes for chemistry and physics.

The year's chemistry prize went jointly to Dr. Glenn T. Seaborg and Dr. Edwin M. McMillan, both of the University of California at Berkeley.

Seaborg is a co-discoverer of five elements, including pluto-



DR. GLENN T. SEABORG
One of Two U. C. Winners

onium, which greatly expanded the potential amount of atomic fuel and thus made the atomic bomb cheaper.

PLUTONIUM PIONEER

McMillan is a co-discoverer of plutonium and also neptunium, the first heavier-than-uranium element, which led researchers into a wonderland of new substances. His experiments have shown scientists how to multiply tenfold the power of their cyclotron atom smashers, and have made it possible for them to create cosmic rays in their laboratories.

The physics prize was also awarded jointly, to Sir John Cockcroft, the British government's top atomic scientist, and Professor E. T. S. Walton of Dublin's Trinity College. The two were the first to split atomic nuclei with artificially boosted high tensions—a 1932 experiment which paved the way for the atomic age.

\$32,000 PRIZE MONEY

Each team will divide an award of 167,612 Swedish crowns (about \$32,357). The money comes from a trust fund established by the late Alfred Nobel, Swedish inventor of an earlier weapon of war, dynamite.

During World War II Seaborg headed the team of scientists which produced plutonium for the atom bomb dropped on Nagasaki. Cockcroft was wartime director of Canada's atomic energy project and now heads Britain's atomic energy research station at Harwell.

The chemistry and physics prizes were awarded by the Swedish Academy of Science.

All recipients will be awarded their prize money by King Gustav VI at ceremonies in Stockholm December 10.

Nobel Prize Presented to 2 U.C. Scientists

University of California Professors Edward McMillan and Glenn Seaborg today formally received the Nobel Prize from King Gustav Adolf of Sweden at a ceremony in Stockholm.

Both men, world-renowned atomic scientists, were jointly awarded this year's prize in chemistry for their work in the development of nuclear energy. They will share \$32,357 in prize money.

According to press dispatches, the ceremony was held in a crowded Stockholm concert hall as Sweden observed the 55th anniversary of the death of Alfred Nobel.

The university scientists were the third and fourth men, respectively, to shake the hand of Sweden's King and bow to Queen Louise at today's ceremony.

They followed the two winners of the physics award, Sir John D. Cockcroft of Britain and Prof. E. T. S. Walton of Ireland. Dr. Max Theiler of the United States, winner of the award for medicine and Par Lagerkvist of Sweden, winner of the literature award, also received their prizes at the ceremony.

Both Seaborg, 39, and McMillan, 45, were accompanied to Sweden by their wives. Seaborg lives at 1154 Glen Road, Lafayette, and McMillan resides at 150 Purdue Avenue, Berkeley.

U.C. Pair Slated For Nobel Prize

Two U.C. Atom Scientists Slated for Nobel Prize

Continued From Page 1.

BERKELEY, Nov. 15.—Two of America's top scientists, Dr. Glenn T. Seaborg and Dr. Edwin M. McMillan, both University of California professors, today are expected to be named 1951 Nobel Prize winners in chemistry.

The Royal Swedish Academy of Science meets in Stockholm today to vote the awards, but according to press dispatches, all indications pointed to the California pair.

If chosen, the total of Nobel Prize winners on the University campus will be boosted to six.

The prize carries an emolument of 167,612 Swedish Crowns or about \$32,357, from a trust fund established by the inventor of dynamite, the late Alfred Nobel.

Seaborg is the discoverer of five new elements of matter, including plutonium, the substance which destroyed Nagasaki. McMillan, through his earlier discovery of the element Neptunium, paved the way for Seaborg's discovery.

Seaborg is responsible for the discovery of four of the six ele-

ments made artificially by the University's cyclotron laboratories.

Until 1940, artificially produced elements were not known. Before then, all the known elements were naturally produced, such as gold, oxygen, sodium and iron. The total of these natural elements made up the chemical periodic table and ended with element 92.

During that year, however, Dr. McMillan and P. H. Abelson of the University, bombarded uranium, a natural element, with neutrons and produced neptunium, element 93.

ATOMIC AGENT

Again that same year the periodic table grew with the discovery by Seaborg, McMillan and associates of plutonium, element 94. This element is the chief explosive agent of the atomic bomb.

In 1944, element 95, or americium, was produced by Dr. Seaborg and associates. The same year, Seaborg and associates discovered element 96, curium.

In 1950, the 39-year-old scientist discovered berkelium or element 97, and californium, element 98.

A University of California graduate, Dr. Seaborg lives at 1154 Glen Avenue, with his wife Helen, and four children.

Forty-four-year-old McMillan, recipient of many of the Nation's top scientific honors, is widely known as co-discoverer of neptunium, the first of the transuranium elements; and of plutonium, the atomic bomb element.

DEVELOPS THEORY

In 1945, he developed independently the "theory of phase stability," which has made possible the development of multi-million and multi-billion volt atom smashers, including the synchrotrons, synchrocyclotrons and the bevatron.

During World War II, the physicist contributed to the evolution of radar and underwater sound devices for submarine development and was active in the Manhattan Engineer District atomic project.

McMillan's theory of phase stability has made it possible for scientists to create man-made cosmic rays.



Sir John Cockcroft (left) leading contender for the Nobel prize in physics, and Par Lagerkvist, who has been awarded the Nobel Prize in literature.—AP Wirephotos.



Dr. Edwin M. McMillan (top) and Dr. Glenn T. Seaborg, University of California professors, are expected to win the 1951 Nobel Prizes in chemistry.

Under his guidance on the 184-inch cyclotron, mesons, a mysterious atomic particle, were made for the first time in a laboratory.

A graduate of the California Institute of Technology, he lives at 265 Lake Drive, with his wife, Elsie, and their three children.

Swedish Novelist Wins Prize in Literature

STOCKHOLM, Nov. 15.—(AP)—The Swedish Academy today awarded the 1951 Nobel prize for literature to one of its own members, Par Lagerkvist, author of the novels "The Dwarf" and "Barabbas." Lagerkvist, who is 60 years old and a playwright, poet, essayist and writer of short stories as well as a novelist, will receive a check for 167,612 crowns (\$32,357) from King Gustav Adolf at the Nobel Prize presentation ceremony to be held in Stockholm on December 10.

The selection of Lagerkvist for this year's literature prize was not unexpected here. He was mentioned among contenders in 1949 and again in 1950, running second to American Novelist William Faulkner in the academy's balloting in the latter year.

He is the fourth Swede to win the prize.

In choosing Lagerkvist, the academy, of which he has been a member since 1940, clearly followed the wishes of the donor of the prize, Alfred Nobel. Nobel stipulated that the writing of prize winners should have "an idealistic tendency."

FORCE, INDEPENDENCE

The academy announcement said: "For the artistic force and deep independence by which he in his writing tries to find an answer to the eternal problems of mankind, the academy has decided to award the Nobel prize for literature to Par Lagerkvist."

Although Lagerkvist has written more than 30 books since he published his first work in 1912, he was little known outside Scandinavia until the appearance of his novel of the renaissance, "The Dwarf," in 1944. It appeared in translation in the U.S. in 1945.

In 1950, he reached the ranks of international bestsellers with "Barabbas," a novel about the thief saved from crucifixion when the Jews chose to have him released instead of Jesus. This novel was translated into 11 languages within a year of its publication in Sweden and was published in America last month.

Cal Has Six on Famous List

Glenn Seaborg and Edwin McMillan yesterday joined a distinguished band on the Berkeley campus—four other men who also are Nobel laureates.

Among them is Ernest Orlando Lawrence, professor of physics and director of the radiation laboratory. He was awarded the 1939 prize in physics "for the invention of the cyclotron, its development and results obtained.

Two years ago William F. Giaque, professor of chemistry, received the Nobel award for his contributions in the field of chemical thermodynamics.

Two other men, presently at the University of California, shared the 1946 prize in chemistry. They are John Howard Northrop, professor of bacteriology, and Wendell M. Stanley, professor of biochemistry.

Northrop won recognition for his preparation of pure enzymes, and Stanley for the preparation of pure crystalline viruses.

CALIFORNIA MEN AWARDED NOBEL PRIZES

Seaborg and McMillan Cited For Atomic Research

STOCKHOLM, Nov. 15.—(AP)—Four scientists who are architects of the atomic age and an author whose best-seller novel is laid in the time of Christ won 1951 Nobel prizes today.

The chemistry prize was shared by two Americans—Dr. Glenn T. Seaborg and Dr. Edwin M. McMillan, both of the University of California at Berkeley. They are co-discoverers of plutonium, a substance that made it easier and cheaper to produce atomic bombs. McMillan's work made it possible to create cosmic rays in the laboratory.

SHARE PRIZES—

A Briton and an Irishman shared the prize for physics. They are Sir John Cockcroft, director of Britain's "atomic city" at Harwell, and Prof. E. T. S. Walton of Dublin's Trinity College. They won the prize for their work as a team in 1932, when their experiments in splitting atomic nuclei with artificially propelled bullets helped pave the way for the present status of atomic affairs.

Par Lagerkvist, a Swedish author whose novel "Barabbas" is high on best seller lists in the United States, won the literary prize. He is a poet, essayist and philosopher as well as novelist.

His novel tells what happens to Barabbas, the ruffian, after Jesus took his place on the cross.

The cash value of the prize in each field is about \$32,357. In the case of the joint awards, the money is split 50-50. King Gustaf VI will hand out the checks at elaborate ceremonies in Stockholm December 10.

By JOHN F. ALLEN

In the field out of which the atom mushroomed into a bomb, every worker seems to be a genius and men in their prime are "pioneers."

Both designations in their best and highest connotation, their associates agree, belong to Edwin McMillan and Glenn Seaborg of the University of California, who yesterday shared a Nobel prize in chemistry.

For these young men (Glenn Seaborg is 39, Ed McMillan 44), in a rare combination of cloud-high theory and down-to-earth mechanical aptitude, did as much as any team to put their country strides ahead in the race for atomic supremacy.

NEW ELEMENT—

They discovered the new element plutonium, the first synthetic element man has ever seen.

They also devised the method by which it could be separated in quantity from uranium and thus be used as the cheapest and most practical explosive core of the atom bomb.

It is this system which is now in use at Hanford, Wash., and Oak Ridge, Tenn.

Despite that spectacular contribution to the world of science, it was far from being the only one.

To Seaborg, for instance, goes the credit for the discovery of a half dozen other elements; to McMillan the credit for an idea which increased by sixty times or more the potency of atom smashers.

MUCH IN COMMON—

The two men share many things in common. Both are equally at home in the rarified atmosphere of the tiny room with blackboard and chalk where minds work from theory to equation to acceptable fact and the laboratory or mechanical shop where hands take over from brains.

Seaborg was born in Ishpeming, Mich., of immigrant Swedish parentage. He fought his way through financially lean undergraduate years at the University of California at Los Angeles, working as stevedore and fruit picker, newspaperboy and laboratory janitor.

He managed a Phi Beta Kappa key along the way, and in 1937 won his Ph.D. on the Berkeley campus.

Four years later he was an assistant professor of chemistry and he was already deep in the awesome world of radioactive isotopes.

FINAL TASK—

In 1940, after his co-worker, Ed McMillan, was called away to another job, Glenn Seaborg went on to the final pinpointing of plutonium.

Those were the days when the United States was in the midst of history's greatest gamble, billions of dollars against the hopeful theory that atomic fission could bring a quick end to a bloody war.

The Manhattan Project called Seaborg to Chicago to work out a chemical means of producing great quantities of his new element. He said he could do it in six months.

James Conant of Harvard said it would take five years. It took six months.

As a sort of side issue while with the Manhattan Project, Glenn Seaborg gave the world two more new elements, americium and curium.

And since his return to Berkeley, he and his co-workers have added a couple more, berkelium, named for the city, and californium for the State.

In the spring of 1942 he took just enough time to leave Chicago and the bomb to marry Helen L. Griggs, secretary to another Nobel laureate, Dr. Ernest O. Lawrence.

Today they have four children: Peter, 5; Lynn, 4; David, 2, and Stephen, 3 months.

Ed McMillan is a smaller man, neat and quick, with a receding hairline and a clipped mustache. Like Seaborg he combines his theory with practice.

NATIVE SON—

Born in Redondo Beach of a physician father, McMillan had an easier time with his schooling, coasting comfortably through Pasadena public schools and then going on to the California Institute of Technology for his bachelor and master's degrees, and to Princeton for his doctorate—all in physics.

He came to Berkeley in 1932 as a National Research Fellow, staying on to work his way quickly upward in the physics department to a full professorship in 1946.

Working with the University of California cyclotron, Ed McMillan picked up a number of hints from workers in France and Italy that one of the by-products of the splitting of the uranium atom was actually a new element.

YEARS OF STUDY—

After years of careful effort he proved his point and announced, with his co-workers, the discovery of neptunium. It was only a step from that discovery to his early work on plutonium, the final discovery of which he was forced to leave to Seaborg when he was called away.

That was in 1940, when he was summoned to the Massachusetts Institute of Technology to become a member of the team which perfected the military use of radar and sonar.

In the fall of 1942, he went with J. Robert Oppenheimer to Los Alamos, and there worked on both the Hiroshima and Nagasaki bombs.

He returned to Berkeley in 1945 to work again with the atom smashers—and it was here that he produced what some day may become by far his most important contribution to science.

Early atom-smashers were limited to a power of around 100 million electron volts. When attempts were made to increase the power by electrically stepping up the speed of the bullet particles, it was found that the particles and the electric "jolts" would quickly fall out of step with each other.

McMillan perfected a method of manipulating the magnetic field around the smashers and the pushing electric impulses so that they remained always in step.

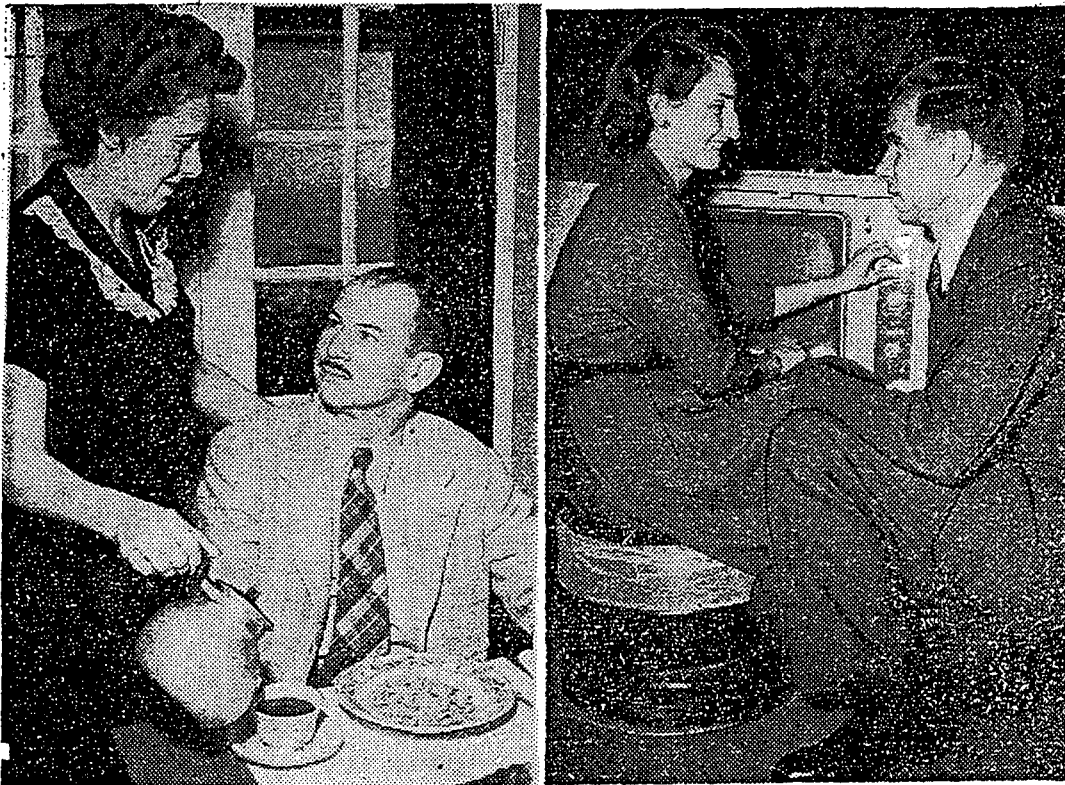
SPEED-UP—

His discovery meant that the newest Berkeley atom-smasher—the bevatron—will accelerate proton bullets to 6.4 billion electron volts. Already this speed-up has made it possible for man to produce artificial cosmic rays.

McMillan is married to the former Elsie Blumer, daughter of Dr. George Blumer, retired dean of the Yale University school of medicine, and a sister of Ernest Lawrence's wife.

They live at 150 Purdue Avenue, Berkeley, with their three children, Ann, 8, David, 6, and Stephen, 1.

When time permits again Ed McMillan looks forward to a return to his early love, mountain climbing. He once scaled the Matterhorn.



The University of California scientists who are joint winners of this year's Nobel Prize in chemistry pose with their wives. In the left photo are Dr. Edwin M. McMillan and his wife, Elsie; at right are Dr. Glenn T. Seaborg and Helen Seaborg.

Two U.C. Winners of Nobel Prize Vague on Plans for Trip to Sweden

BERKELEY, Nov. 16. — Two University of California Nobel prize-winning scientists today prepared for the trip to Stockholm for presentation of the awards in a most unscientific manner.

Dr. Glenn T. Seaborg, professor of chemistry and discoverer of five new elements of matter, said he and his wife would go "but I don't know how; we'll be there somehow."

And Dr. Edwin M. McMillan, professor of physics whose discovery of the element Neptunium paved the way for Seaborg's discovery of Plutonium, said: "I guess we'll fly."

The Royal Swedish Academy of Science voted the pair a joint 1951 award yesterday for their work in nuclear research at their annual Stockholm meeting.

SHARE PRIZE MONEY

They will share prize money of \$32,357 from the trust fund established by the inventor of dynamite, the late Alfred Nobel.

Members of the scientific awarding body said they regard Seaborg's contributions to chemistry as "epoch making" and of "vital importance to nearly everything in nuclear science."

Seaborg, 39, and his associates, including McMillan, have extended and revamped the roll call of the elements and his discovery of Plutonium greatly expanded the potential amount of available atomic fuel.

McMillan, 45, a mountain climber in his spare time, is credited with "souping-up" the cyclotrons by the adaption of one of the premises of Einstein's theory of relativity.

In a rollicking press conference at U.C. yesterday the two scientists were congratulated by their colleagues including two other Nobel winners, Dr. Ernest O. Lawrence and Dr. William F. Giaque.

WINDFALL STUNS

Both said they didn't know what they would do with their prize money. Standing in front of an atomic chart to which Seaborg added the latest element, Californium, McMillan was chided because he, a physicist, won the Nobel prize for chemistry.

Dr. Raymond T. Birge, chairman of the department of physics, commented "the only difference between the physics and chemistry departments is their budgets." Dr. Wendell M. Latimer, emeritus dean of the

college of chemistry, pointed out that both Seaborg and Giaque studied for their PhD's under Dr. George Ernest Gibson, U.C. professor of chemistry.

Dr. McMillan and his wife Elsie have three children: Ann, 8; David, 6; and Stephen, 1. Dr. Seaborg and his wife Helen, have four; Peter, 5½; Lynn, 4; David, 2½; and Stephen, 3 months.

As a result of the work of these men, scientists now have a master plan of all the known substances which shows their relations to each other. To work out these tables, Seaborg and his associates had to deal with incredibly small amounts of the heavier-than-uranium elements which were made in the atom-smashing cyclotron.

The new quantities were made in something less than a millionth of an ounce and called for instruments and techniques not then known. This general technique is now called ultra-microchemistry.

A University of California graduate, Dr. Seaborg lives at 1154 Glen Avenue. Dr. McMillan was graduated from the California Institute of Technology and lives at 265 Lake Drive.



JOHN COCKCROFT



E. MACMILLAN



GLEN T. SEABORG



E.T.S. WALTON



DN De fyra Nobelpristagarna i fysik och kemi (upptill) omges av sir John Cockcroft med sonen Christopher i lektagen 16/11 på ämbetsrummet i Harwell, och (l. h.) Glenn Seaborgs svenska släktingar Karl och Jenny Adolfsson i Kopparberg med tidningsklippen om systersonen-kemipristagaren. 1951

Kemist med svensk släkt fick pris före

En engelsman, en irländare och två amerikaner, samtliga atomforskare, fick dela på årets fysik- och kemipris. Fysikpristagare blev sir John D. Cockcroft, chef för de engelska atomanläggningarna i Harwell, och professor E. T. S. Walton vid universitetet i Dublin. Kemipriset delas av svenskättlingen Glenn T. Seaborg och Edwin M. McMillan, som båda är professorer vid Berkeley i Kalifornien.

Cockcroft och Walton får priset — enligt Vetenskapsakademins motivering — "för sitt pionjärarbete vid genomförandet av kärnomvandlingen medelst artificiellt accelererade partiklar", ett arbete som de båda forskarna utförde redan i början av 1930-talet. Det betydde att för första gången Einsteins berömda sats om ekvivalensen mellan massa och energi experimentellt bevisats. skriyer professor Erik Hulthén i sin presentation av de båda pristagarnas vetenskapliga verk.

Seaborg och McMillan belönades "för sina upptäckter inom de transurana grundämnenas kemi", det är forskning som McMillan inledde 1940 med upptäckten av det första transurana grundämnet, nr 93 neptunium, och som Seaborg fortsatt fram till nr 98 californium, ersätter professor Lars Gunnar Sillén i sin presentation.

Samtliga fyra pristagare hoppas kunna vara i Sverige då kongungen delar ut priset. De får vardera 83.806 kr. Se sidorna 7, 14 och 15.

DN presenterar årets pristagare

Årets fysik- och kemipristagare och de vetenskapliga insatser för vilka de tilldelats priset presenteras i en rad artiklar inuti tidningen.

Om "Cockcroft, Walton och atomsprängningen" skriver professor Erik Hulthén, om "Seaborg, McMillan och transurannerna" professor Lars Gunnar Sillén. Dagens Nyheters Londonkorrespondent, Daniel Viklund, har intervjuat sir John Cockcroft i hans hem i Harwell, och Dagens Nyheters utsände, Karl Axel Tunberg har besökt professor E. T. S. Walton i Dublin. Sven Ahman, Dagens Nyheters New York-korrespondent, har talat med de två amerikanska kemipristagarna Glenn Seaborg och Edwin McMillan. DN-medarbetaren Age har hälsat på hos Seaborgs svenska släkt utanför Kopparberg.

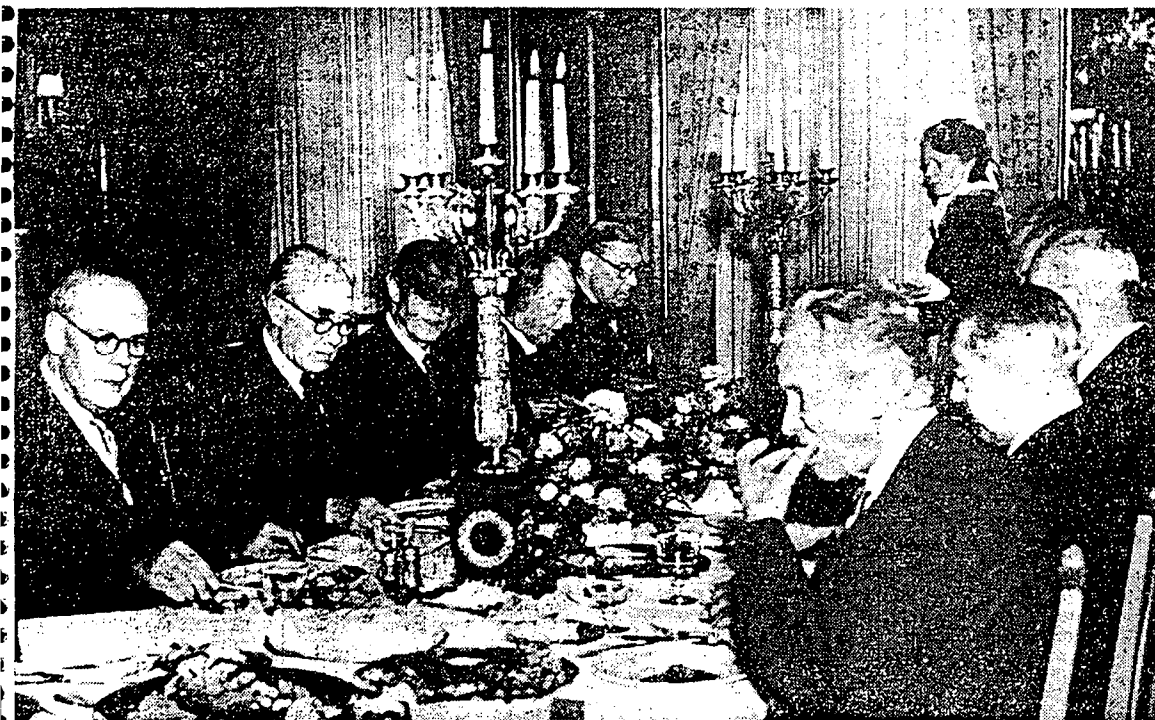
Se sidorna 7, 14 och 15.

fyllda 40



Glenn Seaborg och hans mor, en bild som tagits i Kalifornien och sänts över till den svenska släkten i Kopparberg.

DARE, AMERIKANER FICK PRIS I ATC



Efter välförärrätt varv samlades akademins ledamöter som vanligt till ärtmiddag i Gylde Fredens Zornrum. Bilden visar fr. v. H. S. Nyberg, Nils Ahnlund, Einar Löfstedt, Bo Bergman, Gustaf Hellström, Sigfrid Siwertz, Hjalmar Gullberg och Anders Österlings näck.

Bergslagsmål först, engelska sedan i Seaborgs amerikanska föräldrahem Grundämnena 99 och 100 kommer snart

Från Dagens Nyheters New York-korrespondent SVEN AHMAN

Professor Glenn T. Seaborg talade bergslagsmål innan han lärde sig engelska, berättar han för Dagens Nyheters korrespondent, och fortfarande förstärker han svenska ganska bra och kan också läsa och tala detarelystnad. I Berkeley har han också haft tillfälle att arbeta med basfrån Grängesberg, och i hemmet undrar hans uppväxtår talade föräldrarna svenska, så att både Glenn och hans syster lärde sig språket som små — åtminstone, tillägger han försiktigtvis, det slags svenska som är och mor talade. Nobelpristagaren har mycket noga reda på sitt svenska stamträd.

— Jag har varit i kontakt med hans egen specialsport. Hans far var en internationellt känd kärnforskare som själv född i Amerika, men modern kom först som sjuuttonåring dit utifrån Grängesberg, och i hemmet undrar hans uppväxtår talade föräldrarna svenska, så att både Glenn och hans syster lärde sig språket som små — åtminstone, tillägger han försiktigtvis, det slags svenska som är och mor talade. Nobelpristagaren har mycket noga reda på sitt svenska stamträd.

När Dagens Nyheter ringde upp Seaborg och meddelade honom nyheten om Nobelpriset, två minuter efter det rapporten därom nått New York blev han för ett ögonblick mällös då korrespondenten bad honom säga på svenska hur det kändes. "Det är roligt, that's all I can think of", sade han efter ett par sekunders tvekan.

Sedan han på engelska något uttömligare uttryckt sin glädje över utmärkelserna förklarade Seaborg att han tänker flyga till Stockholm för att personligen hämta Nobelpriset. Sannolikt följer hans maka med. Men de fyra barnen får stanna hemma.

Inte många USA-forskare av hans generation, om ens någon, har heller haft så flitigt utbyte med svenska kolleger och institutioner som Seaborg i sitt strålningslaboratorium i Berkeley ute vid Stilla Havskusten.

NEW YORK, torsdag. Av sina kolleger beskrivs professor Seaborg som en man med stor förmåga att arbeta med basfrån Grängesberg, och i hemmet undrar hans uppväxtår talade föräldrarna svenska, så att både Glenn och hans syster lärde sig språket som små — åtminstone, tillägger han försiktigtvis, det slags svenska som är och mor talade. Nobelpristagaren har mycket noga reda på sitt svenska stamträd.

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Enligt senare publicerade uppgifter var Seaborg den som främst hävdade att man skulle försöka göra bomber även av plutonium i stället för enbart av uran, och med stöd av bland andra Nobelpristagaren Arthur H. Compton vann den unge mannen gehör för sin synpunkt gentemot sådana auktoriteter som Harvardrektor James B. Conant, vilken höll på uranet.

Plutonium blev det nittifjärde grundämnet när dess första, inte ens vägbara förekomst konstaterades 1940. Sedan har serien som man vet förlängts — med americium och curium 1944, med berkelium och californium 1940. Alla dessa konstgjorda grundämnen har först framställts av Seaborg i Berkeley tillsammans med nya isotoper av uran, neptunium och andra redan kända element. Därmed är serien kända grundämnen uppe i 98.

Grundämnena 99 och 100 kommer

— Kommer de snart att vara 100? Dagens Nyheter ställer frågan och behöver inte vänta på svaret: — Det är sannolikt att de s. k. transurana grundämnena har successivt kortare livstid, ju högre upp i serien man kommer, säger professor Seaborg. Deras snabba sönderfall till följd av radioaktiviteten gör det allt svårare att identifiera dem. En annan faktor som bidrar till svårigheterna är att själva mängden av det utgångsmaterial som står till buds för den radioaktiva beskjutningen blir allt mindre, ju längre man går. Ändå tror jag att det inom de närmaste fem åren kommer att bli möjligt för någon att syntetiskt framställa och identifiera de nästa två grundämnena, med atomnumren 99 och 100. Så småningom kommer man att kunna tränga ett eller ett par steg vidare, kanske ända längre, mer detta kräver nya tekniska metoder för att upptäcka och iaktta material som mycket kort livslängd.

Vem den "någon" han talar om kan tänkas bli säger Seaborg ingensting om, men man kan ju alltid gissna. Att vederbörande kommer att ha sin adress vid strålningslaboratoriet i Berkeley är ganska sannolikt. Därifrån har just rapporterats att fyra av professor Seaborgs medarbetare lyckats framställa de båda tyngsta atomer vilkas existens någonsin konstaterats. Isotoper av grundämnena berkelium och californium med atomvikterna 245 och 246. Den nya berkelium-isotopen har en halv livslängd av fem dagar, californium 246 endast 35 timmar. Den som skall bygga upp och hinna studera ännu tyngre grundämnen får tydligen skynda sig.

Moderns släkt kvar i Sverige

Min mors släkt är till största delen kvar i Sverige. Min morbror Karl Johan Adolfsson bor i Kopparberg, och till sin död för några månader sedan bodde en annan morbror, Werner Adolfsson, i minnas. Jag har också en kusin, Ruth Kjellgren, dotter till min mors äldre syster.

— Jag har varit i kontakt med hans egen specialsport. Hans far var en internationellt känd kärnforskare som själv född i Amerika, men modern kom först som sjuuttonåring dit utifrån Grängesberg, och i hemmet undrar hans uppväxtår talade föräldrarna svenska, så att både Glenn och hans syster lärde sig språket som små — åtminstone, tillägger han försiktigtvis, det slags svenska som är och mor talade. Nobelpristagaren har mycket noga reda på sitt svenska stamträd.

Kämpade för plutonium

— Så snart vi fått fram den tyngsta isotopen var möjligheterna uppenbara, säger Seaborg. I april 1942 kallades han till Chicago för att arbeta på en forskargrupp fortsatt en sida av det väldiga arbete som han ledde till den första atombomben. I laboratoriemässigt miniatyrförmåt utarbetade han där den kemiska separationsprocess som sedan användes för fabrikation av plutonium i tio miljarder gånger

Lilla Otto gick i småskolans andra klass. Han lärde sig att räkna på fingrarna och efter mycket möda fick han antalet fingrar till tio. För det räknetycket fick han mycket beröm av lärarinnan, men hon frågade hur många fingrar hans pappa hade.

— Stor begrundan från Ottos sida, men så kom svaret: — Jo, han har allt många fler och så är de så stora och lortiga.

Brandlarmet gick mitt i natten. Verkmästare Jonsson, som tillhör borgarbrandkårens elit, rusar yrkvet upp frågande sin lika yrvakna hustru:

— Var e min hjälm?
— Den står under sängen —
— Äkta dej så du inte spillar!

— Kors — klockan är snart halv sex.
— Vad säger du? Då måste jag skynda mig hem och gå upp.

Hos Seborgs svenska släkt:

**Morbror i faluröd Bergslagsvilla
skickar duk, får kaffe i juletid**

Från Dagens Nyheters utsända medarbetare

KOPPARBERG, torsdag.

I Herrhagen, som ligger på en höjd ovanför Kopparberg med utsikt över två gravor och blånande berg, bor Glenn Seborgs morbror Karl Adolfsson och hans fru Jenny. De har en faluröd villa i en stor och välkött trädgård. Varje dag beger sig Karl Adolfsson ned för backen till järnvägens verkstäder, där han arbetar som filare och där sonen Bengt är målare.



Mona Möller, kusinbarn till Glenn Seborg, visar en blå flickväska, en present av Nobelpristagaren vid hans Sverigebesök.

Det var nära att Karl Adolfsson följt med till Staterna, när de äldre syskonen emigrerade, ty de hade erbjudit honom biljett. Men han var yngst och ville inte lämna de gamla föräldrarna ensamma. Han emigrerade aldrig längre än från Grängesberg till Kopparberg, och han gifte sig med en Grängesbergflicka. Familjen omfattar nu tre barn, Bengt, Gösta och Karin samt barnbarnet Mona.

Glenn Seborgs mor emigrerade 1904 till Amerika i sällskap med andra ungdomar. Hon arbetade i familjer första tiden och gifte sig sedan med Teodor Seborg i Ishpeming, Michigan. Under alla de år som gått har Selma Seborg hållit kontakten med lillebror hemma i Bergslagen, hon har skrivit brev, sänt fotografier och senare, när Glenn började bli ett namn inom vetenskapsvärld, också tidningsurklipp. Hon har länge bearbetat Karl och Jenny att resa över och besöka släkten i Staterna, och det kommer de nog att göra innan de blir för gamla.

Svenska dukar, amerikanskt kaffe

Det var oerhört glädjande att Glenn fått Nobelpriset, säger Karl Adolfsson. Jag vet att Glenns föräldrar drömde om att deras son skulle få denna förmåliga utmärkelse, de kommer att bli mycket lyckliga.

När Dagens Nyheter besöker familjen Adolfsson ligger fotografier och klipp framme, och vi tittar på bilder av Glenn som ung student från den tiden då han arbetade i nattskift som extra laboratorieassistent på Firestones gummfabrik och tjänade till studierna, bilder av Glenn och hans fästna Helen Griggs, som var sekreterare åt cyklotronens konstruktör Ernest O. Lawrence, av de unga tu som nygifta och av deras barn Peter, Lynne och David. Annu har inte farmor hunnit sända över någon bild av den allra minsta babyen, som anländer för ett par månader sedan. Det är för resten inte bara brev och bilder som går tvärs över Atlanten, till jul skickar familjerna Adolfsson och Seborg varandra julkappar. Från Sverige kommer praktiga handdukar, broderade juldukar eller hemvävda löpare, och de korsar kaffeburkar och nylonstrumpor på väg hit.

Svenskar hos Seborg:

**Polisspärrear vid alla ingångar,
rigorös kontroll vid laboratoriet**

Säkerhetskontrollen vid professor Seborgs laboratorium är rigorös. Hela området är inhägnat, och vid alla ingångar finns polis-spärrear, där alla som har ärende in — även de som arbetar på laboratoriet — blir visiterade och får legitimeras sig. De utrustas sen med ett märke på rockuppslaget som anger inom vilka avdelningar de får röra sig, berättar fil. lic. Jan Rydberg, försvarets forskningsanstalt.

Lic. Rydberg tillhör den grupp svenska vetenskapsmän som arbetat hos professor Seborg, och bland dem är han den som har de färskaste erfarenheterna. Han kom till Berkeley universitet i mitten av januari i år och stannade där två månader till i mitten av mars.

Nu uppehåller sig professor Seborg mest inom de allra hemligaste avdelningarna, dit jag inte fick tillträde och dit man bara får komma efter tillstånd av de båda cheferna för laboratoriet, professor Seborg, som förestår den kemiska avdelningen, och professor E. H. Lawrence, som förestår den fysiska, fortsätter lic. Rydberg. Men en gång i veckan gick professor Seborg på laboratoriet för att hålla kontakten med det hundratal vetenskapsmän som arbetar på den kemiska avdelningen.

Och varje torsdag hölls seminarier, som var högst informella tillställningar och inte precis vad vi är vana vid. Ingen speciell talare utsågs i förväg, utan när alla samlats spände Seborg ögonen i någon närvarande och undrade:

Nå, vad har du sysslat med på sista tiden.

Sen skulle man då redogöra, och det gjorde att på onsdagskvällarna var fliten mycket stor på laboratoriet. Ingen visste ju vem som skulle få frågan, och det systemet är nog ganska nyttigt för den intellektuella livaktigheten, säger lic. Rydberg.

Seborg räknade med att ungefär två tredjedelar av hans tid gick till arbete som var av strikt hemlig natur, medan en tredjedel avkastade sådant som kunde publiceras relativt snabbt.

Håller styvt på Sverige

Fil. mag. Gösta Rydstam vid Gustaf Werners institut i för kärnkemi i Uppsala arbetade under professor Seborg från mars till september i fjol. Han som andra intygar hur styvt professor Seborg håller på sitt svenska ursprung.

Han talade gärna om sitt besök i Sverige 1949, och när han fick höra att vi båda stammade från Västmanland föll det sig än naturligare att tala om det gamla landet, säger magister Rydstam.

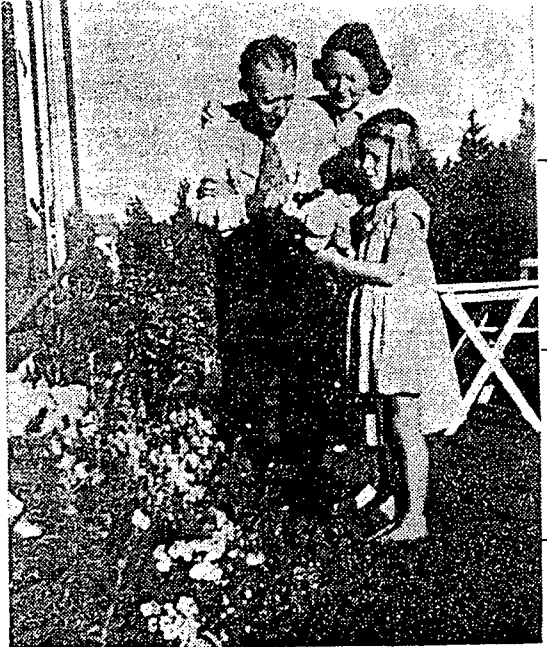
Docent Karl-Erik Zimen vid Chalmers var hos Seborg ett halvt år 1948 för att studera utrustningen av laboratorium med tanke på det kärnkemiska laboratoriet som då skulle byggas upp i Göteborg enligt atomkommitténs beslut. Följande år träffades de både i Stockholm och Göteborg, och just från Göteborg har docent Zimen en ganska rar historia att berätta.

Seborg skulle telefonera hem till fru och barnen i Kalifornien. Samtalet kom, och när tiden var ute undrade vi hur det hade gått att få kontakt runt halva jordklotet.

Det gick fint och mrs Seborg och barnen mådde bra, sa professorn. Men det nästan roligaste av allsammans var att universitetets rugbylag har vunnit sin match i dag.

Sina vänners vän

Bland andra svenskar som besökt Berkeley och professor Seborg är fil. dr. Lars Melander och professor Hilding Slätis, båda vid Nobelinstitutet i Frascati. De såväl som andra som haft kontakt med Seborg understryker att han är en hårt arbetande vetenskapsman som nätt en oerhörd överlägsenhet inom sitt område, som personligen kan synas butter och tvär och ingenting gör för att stryka folk medhårs, men som framför allt är sina vänners vän.



16. 11. 1951
Bland Seborgs närmaste släktingar märks Carl Adolfsson i Kopparberg som här ses tillsammans med hustrun och dotterdottern Mona. De väntar storförman-
de vad det lider...

B.P. 5/12 1951



Nobelpristagaren Glenn Seborg med hustru — i mitten — möttes på Bromma av släktingarna Edit Larsson och Knut Berglund. den 3. 12. 51



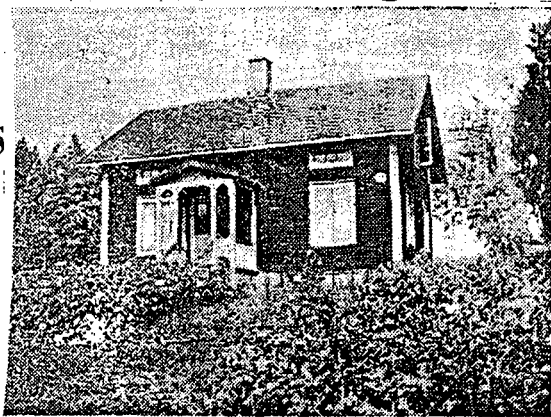
5. 12. 51
Moster Jenny och morbror Karl Adolfsson i Frövå flankerar här nobelpristagaren och hans fru.

Grängesättling blev nobelpristagare

Delar årets "guld" i kemi två fysikforskare belönas

Stockholm torsdag (TT)

Årets nobelpris i kemi delas av professorerna Glenn T. Seaborg, och Edwin M. McMillan, båda i Berkeley, Kalifornien, för deras upptäckter inom de transurana grundämnenas kemi. De får vardera 83 806 kr. Fysikpriset delas av sir John Cockcroft i Harwell, England och E. T. S. Walton, Dublin. Grängesättlingen Glenn Theodore Seaborg är född i Ishpeming, Mich., 1912 och har tillbringat både sin tid som student och lärare vid Kalliforniska universitetet. Han var sålunda "instructor" vid University of California 1939, assistent professor 1941 och ordinarie professor sedan 1945.



Lisselmågtorp vid Grängesberg där Seaborgs mor är född.

Edwin Mattison McMillan är född 1907 i Redondo, Kalifornien. Han blev doktor i Princeton 1932, men återvände sedan till de kalliforniska universiteterna, där han var "fellow" och assistent professor 1932—1946 och ordinarie professor sedan 1947. Under krigsåren tjänstgjorde han som forskare vid försvaret.



Glenn T. Seaborg

Seaborg och McMillan, båda vid universitetet i Berkeley, Kalifornien, har var för sig lämnat betydelsefulla bidrag till kännedom om transuranerna och till de kärnkemiska undersökningarna i allmänhet. Det var McMillans och hans medhjälparens initiativ, som ledde till upptäckten av neptunium, den första transuranen, medan Seaborgs, och dennes medarbetares undersökningar resulterade i upptäckten av de fem följande transuranerna: plutonium, americium, curium, berkelium och californium. Sir John "Douglas" Cockcroft, som är född 1897, blev efter studier i Manchester och Cambridge professor i "Natural philosophy" i Cambridge 1939. I början av kriget hade han en hög chefspost vid det brittiska försvarets forskningsanstalt, där han snart blev direktör för atomenergiforskningen. Under flera år var han därvid verksam i Kanada. 1946 blev han chef för det nyinrättade laboratoriet för atomforskning i Harwell och det är i denna egenskap hans namn gått ut över hela världen.

Professor Ernest Thomas Stanton Walton, född 1903 på Irland, studerade först i Belfast och Dublin, varefter han kom till Cambridge. Han återvände 1934 till Dublin som "fellow" vid Trinity College, och är sedan 1946 vid universitetet i Dublin som "Erasmus Smith Professor" i "Natural and experimental philosophy". Cockcroft och Walton tillkommer förtjänsten av att ha varit de första som lyckats sönderdelat kärnan i uran. (Forts. på sista sidan.)

Seaborg rörd i går kväll

New York torsdag, (TT:s korr.) Under sitt besök i Grängesberg fick vi också en intervju med Seaborg. Det var en lång, mörklagd man, glad och sympatisk, och talade och förstod svenska mycket bra. Han uttryckte sin glädje över besöket i Sverige som han betecknade som ett mycket gott land, gav en eloge åt Grängesberg och anläggningarna där och var glad över att få träffa sina släktingar. Och förtvå se Lisselmågtorp — sin mors särskilt rörd över utmärkelsen.

Detta blir en stor dag för mina föräldrar, säger den 39-åriga forskaren, som betraktas som en av de främsta männen bakom atombomben. Jag anser mig som hundraprocentig svensk, säger han och bekräftar detta med att på god svenska förklara att han "talar svenska lite grann". Båda pristagarna reser till Stockholm tillsammans med sina fruar.

Något av festytan spred sig på torsdagskvällen över universitetsstaden Berkeley, och stråmingslaboratoriets forskarstab samlades vid kvälledags för att hylla de två kolleger som hade korats till nobelpristagare. Seaborg framhåller att han som svenskättling känner sig särskilt rörd över utmärkelsen.

Glenn Seaborg är en bjässe till föräldrar, säger den 39-åriga forskaren, som betraktas som en av de främsta männen bakom atombomben. Jag anser mig som hundraprocentig svensk, säger han och bekräftar detta med att på god svenska förklara att han "talar svenska lite grann". Båda pristagarna reser till Stockholm tillsammans med sina fruar.

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Atomprofessorns mor bodde i Lisselmågtorp

Meddelandet om att Seaborgs insatser belönats med Nobel-priset är av ett särskilt intresse för Bergslagen där han har sina släktrötter. Från dessa trakter har han nämligen utgått, från Hällefors på fädernet och från Grängesberg på modernet.

När Selma Olivia Adolfsson — atomprofessorns mor — född den 16 mars 1887 i Lisselmågtorp, Grängesberg, vid 17 års ålder, den 2 april 1904, emigrerade till Amerika, kunde varken hon, den fattiga gruvarbetardottern från Grängesberg, eller någon annan ens drömma om att hon en vacker dag skulle få uppleva glädjen av att vara mor till en professor, vars namn skulle telegraferas över hela världen och här, i hennes hemland Sverige, ur konungens egen hand få mottaga Nobelpriset. Hon lever och är fortfarande bosatt i Amerika. Likaså hennes man, Teodor Sjöberg. I professor Seaborgs släktrödet visste vi förut, Det var som än till morfar och mormor. Morfar om kusinerna Karin, Bengt och Adolf Eriksson. Han var född den 30/12 1850 och död den 8/1 1932. Vanligtvis kallades han för Adolf Ersson. Han bodde vid Lisselmågtorp och arbetade i den gamla Pickgruvan, där han var gruvsbyggare. Hans hustru i första gifet — d.v.s. professors mormor — hette Eva Stina Persson, född den 29/7 1850 och död redan den 12/6 1901, alltså tre år innan dottern Selma Olivia reste till Amerika. Hon uppges vara född i Örtjärn samt syster till "Sme-Kalle", en på sin tid ganska bekant Grängesbergare. Beträffande professors farfar så härstammar denne, från Hällefors, varifrån han emigrerade till Amerika, vilket är inte bekant. Under sin hälleforstid var han anställd som förman vid bruket. Han hette Teodor Sjöberg och hans son — professors far — hette också Teodor.

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JOHN COCKCROFT



E. MAC MILLAN



GLEN T. SEABORG



E. T. S. WALTON



DN De fyra Nobelpristagarna i fysik och kemi (upptill) omges av sir John Cockcroft med sonen Christopher i lektagen 16/11 på ämbetsrummet i Harwell, och (i. h.) Glenn Seaborgs svenska släktingar Karl och Jenny Adolfsson i Kopparberg med tidningsklippen om systersonen-kemipristagaren. 1951

Kemist med svensk släkt fick pris före

En engelsman, en irländare och två amerikaner, samtliga atomforskare, fick dela på årets fysik- och kemipris. Fysikpristagare blev sir John D. Cockcroft, chef för de engelska atomläggningarna i Harwell, och professor E. T. S. Walton vid universitetet i Dublin. Kemipriset delas av svenskättlingen Glenn T. Seaborg och Edwin M. McMillan, som båda är professorer vid Berkeley i Kalifornien.

Cockcroft och Walton får priset — enligt Vetenskapsakademins motivering — "för sitt pionjärbete vid genomförandet av kärnomvandlingen i medelst artificiellt accelererade partiklar", ett arbete som de båda forskarna utförde redan i början av 1930-talet. Det betydde att för första gången Einsteins berömda sats om ekvivalensen mellan massa och energi experimentellt bevisats, skriver professor Erik Hulthén i sin presentation av de båda pristagarnas vetenskapliga verk.

Seaborg och McMillan belönades "för sina upptäckter inom de transurana grundämnenas kemi", det är forskningar som McMillan inledde 1940 med upptäckten av det första transurana grundämnet, nr 93 neptunium, och som Seaborg fortsatt fram till nr 98 californium, erinrar professor Lars Gunnar Sillén i sin presentation.

Samtliga fyra pristagare hoppas kunna vara i Sverige då kongungen delar ut prisen. De får vardera 83.806 kr.

Se sidorna 7, 14 och 15.

DN presenterar årets pristagare

Årets fysik- och kemipristagare och de vetenskapliga insatser för vilka de tilldelats prisen presenteras i en rad artiklar inuti tidningen.

Om "Cockcroft, Walton och atomsprängningen" skriver professor Erik Hulthén, om "Seaborg, McMillan och transurannerna" professor Lars Gunnar Sillén. Dagens Nyheters Londonkorrespondent, Daniel Viklund, har intervjuat sir John Cockcroft i hans hem i Harwell, och Dagens Nyheters utskickare Karl Axel Tunberger har besökt professor E. T. S. Walton i Dublin. Sven Ahman, Dagens Nyheters New York-korrespondent, har talat med de två amerikanska kemipristagarna Glenn Seaborg och Edwin McMillan. DN-medarbetaren Age har hälsat på hos Seaborgs svenska släkt utanför Kopparberg.

Se sidorna 7, 14 och 15.

fyllda 40



Glenn Seaborg och hans mor, en bild som tagits i Kalifornien och sänds över till den svenska släkten i Kopparberg.

14
1927

MÖTTE LAGERKVIST SENSATION

STORMAPPLÅD

NY NOVELL



BANKETTIDALEKTER: SMÅLÄNDSKA
OCH BRUTET BERGSLAGSMÅL

*Hela släkten
satt till bords
med vite Pär*

Två svenska dialekter blandades vid den ljusskimrande och pampiga Nobelbanketten i Gyllene salen. Pär Lagerkvists milda trygga småländska och Seaborgs brutna Bergslagsmål. Den unge forskaren tackade rättframt på sin moders språk. Diktaren hade gått till sin ungdom för att finna de rätta orden. Han skrev en gång en novell i en liten by bland Pyrenéerna. Den blev inte tryckt, diktaren ville det inte själv, och så glömdes den bort.

Fortf. sidan sex, spalt ett

VÄLBEKOMMET var Anders Osterlings lyckönskingsord till Pär Lagerkvist, vilka här understryks av kungen, drottningen och prins Wilhelm med applåder och glada leenden då den svenske Nobelpristagaren återtar sin plats på Konserthuspodiet.

Atomkraft i fredlig tjänst

Unga USA-svenskar hävdar sig

Skräcken inför atombomben kom många att glömma den inkörsport till en bättre värld som öppnades genom frigörande av materiens väldiga krafter. Atomenergin har många märkliga egenskaper och den kan utnyttjas inom de mest olika områden och på det mest skiftande sätt. I synnerhet två aspekter av atomenergin lovar mycket för framtiden, nämligen atomkraften och radioisotoperna. Atomkraft för produktion av elektrisk energi och som drivmedel för fartyg är inte blott en utopi. Den engelska atomkommissionens högkvarter uppvärms med atomkraft. Många problem återstår emellertid att lösa innan atomkraften kan rationellt utnyttjas för dessa och andra ändamål.

Användningen av radioisotoper, som närmast är att betrakta som en avfallsprodukt vid vissa atomenergi-processer, har emellertid redan lett till synnerligen värdefulla resultat. För den vetenskapliga forskningen betyder radioisotopen ett större framsteg än upptäckten av mikroskopet för över 300 år sedan. Redan har med dess hjälp viktiga upptäckter gjorts inom läkarvetenskapen och på jordbrukets område. Också industrin har tagit radioisotoper i sin tjänst.

Den amerikanska atomkraftskommissionen har sedan 1946 fullgjort mer än 19.000 leveranser av isotoper. De används nu av över tusen olika institutioner och företag i Förenta Staterna och i 21 andra länder, däribland i stor utsträckning i Sverige.

♦ 5 GRAM KOL I 5.000 TON KALK

Vad som gör radioisotopen så värdefull är dess radioaktiva strålning. I kemiskt hänseende är isotoperna identiska och kan inte skiljas genom kemiska reaktioner. En blandning av ett vanligt grundämne och en motsvarande radioisotop kan därför användas för kemiska reaktioner och kan lätt följas med geigerröret, ett instrument som ger utslag för radioaktivitet. Detta ger möjlighet att studera olika ämnens omkän. Om samma mängd radiokol kunde jämnt fördelas på 50 miljoner råttor skulle geigerröret ändå ge utslag för varje råtta.

♦ TUMÖRER SPARAS

Radioisotoperna i läkarens hand räddar människoliv. Med deras hjälp kan man nu avslöja hjärntumörer som inte framträder på röntgenplatarna. Dessa tumörer upptar fosfor i större utsträckning än normala vävnader.

Om en patient får en insprutning av radiofosfor koncentreras denna i tumören, och med ett geigerrör kan tumörens exakta läge sedan fastställas. Vid Massachusetts allmänna sjukhus har man på detta sätt lyckats upptäcka och lokalisera över hundra hjärntumörer.

Metoden har utarbetats av dr Bertram Selverstone i samarbete med dr Charles V. Robinson.

♦ RADIOFOSFOR OCH KONSTGÖDNING

När ett gödningsämne tillägs radioisotoper kan det sedan följas från marken till växten. Man tillför jordens radiofosfor, radioaktiv superfosfat och kalcium-



EDWIN McMILLAN



GLENN SEABORG

fosfat och undersöker vid vilken tidpunkt växten upptar gödningsämnet och i vilken del av växten det koncentreras. På så sätt hoppas man kunna bestämma växtens behov av konstgödningsämne under hela deras utveckling. Forskningen kan ge jordbrukarna möjlighet att på ett verkligt rationellt sätt tillföra jorden gödningsmedel vid den för de olika växtlagen mest passande tidpunkterna.

♦ KOLONN I SVERIGE

I Sverige har Jordbrukets forskningsråd tagit initiativet till omfattande experiment med radioisotoper. Ett stort steg framåt har tagits genom att en "kolonn" för framställning av tungt kväve har uppförts vid Fosfabolagets anläggningar i Ljunga. Medelvärdet av tungt kväve kan utnyttjas som ledisotop under mer än en vegetationsperiod, och det kan därför bli möjligt att inte blott följa kvävet från marken till växten, utan även från växten till djuret och sedan från djuret genom spillingen åter till växterna.

Över 300 atompatent har frigivits för industriella ändamål och 4.000 olika rapporter och handlingar har offentliggjorts.

♦ ELEKTRISK ENERGI

En fredlig användning av atomenergin öppnar alltså nya vägar att hjälpa människor till hälsa och den kan genom rikare skördar på jordens åkerarealer ge frihet från hunger. Elektrisk energi kan bli tillgänglig i obegränsad mängd till ringa kostnad och industrin kan i många avseenden revolutioneras genom praktisk

tillämpning av atomenergin sällsamt möjligheter. Med en snabb utveckling av denna riktning är möjlig blott om Förenta Nationerna kan nå enighet om internationell kontroll av atomenergin, så att den fria världen helt kan inrikta sitt forskningsarbete på dess användning i samhällsbyggnad och den fredliga utvecklingens tjänst.

Bara gränfall ger Nobelpris åt matematiker

Naturligtvis vore det roligt att kunna ge pris i astronomi, matematik och biologi också, säger professor Arne Westgren, Vetenskapsakademiens sekreterare, med anledning av den kritik mot uppdelningen av Nobelpriset på olika forskningsfält som framträdde i en ledare i New York Times på söndagen och som Hertz Nyheterna New York-korrespondent rapporterade om i måndagsnumret. — Emellertid kan man ju inte andra testamentets bestämmelser, framhåller professor Westgren.

I en del fall har ju forskare på områden som gränsar till kemi och fysik kunnat tilldelas priset — japanen Yakawa (1910) var en sådan teoretisk fysiker vars experiment alltså "skedde på pupprel" var idel ekvationer. I den mån astronoms och matematikers forskningsresultat kommit fysiken och kemien till godo har de fått pris och kommer att få i fortsättningen. Men Nobels festamente har sin fasta lydelse, och den måste följas.

NEW YORK, fredag.

Två svenska namn figurerar på en lista över tio "framstående unga män" i USA som uppgjorts av en jury med bland andra general Eisenhowers bror, som är rektor för Kansas statliga lantbrukshögskola, och filmhövdingen Eric Johnston bland medlemmarna.

De båda är den 35-åriga kemisten Glenn T. Seaborg, som under arbete på kärnfysikens område upptäckte de båda nya grundämnena americium och curium, och en blind 28-åring i Omaha, La Von P. Peterson, vilken grundat en teknisk skola för blinda. Seaborgs föräldrar invandrade till USA från Sverige.

Bland dem som tidigare är vunnit nomineringen som "framstående unga män" är presidentaspiranten Harold Stassen, som inte var mycket över tretio år när han blev guvernör i Minnesota, och Stassen talade vid en bankett i Chattanooga i Tennessee, där årets tio hyllades i onsdags.

Kärnforskning och atomenergi



GLENN T. SEABORG

Den från-Sverige härstammande Glenn Seaborg är sedan ett tiotal år förordad för ett forskarlag vid Berkeleyuniversitetet i Kalifornien, som sysslar med den fysiska uppgiften att framställa nya grundämnen eller i varje fall grundämnen som nu inte förekommer i mätbara mängder här på jorden. Det är de s. k. transurana, d. v. s. element på andra sidan uran, som har ordningsnumret 92. Början gjordes år 1940 med nr. 93, neptunium (av Edwin McMillan), samt nr 94, plutonium, vars syntes blev Seaborgs vetenskapliga bragd. Därpå följde elementen 95—101.

Seaborg är född i Michigan 1912. Hans vetenskapliga karriär är knuten till Berkeley, där han blev fil. dr 1937 och professor i kemi 1945. Under kriget ledde han utvecklingen av de kemiska separationsmetoder, som användes för framställningen av plutoniumbomba, där Pu 239 ersätter U 235. — Tillsammans med McMillan delade han 1951 års Nobelpris i kemi.

Nobelpreisträger 1951

Als Gewinner des Nobelpreises 1951 wurden im Dezember bei den Feierlichkeiten in Schweden und Norwegen 7 Wissenschaftler geehrt — 2 Chemiker, 2 Physiker, 1 Schriftsteller und 1 Gewerkschaftsführer — welche die Länder Frankreich, Schweden, Irland, Groß-Britannien, die Vereinigten Staaten und die Südafrikanische Union vertreten, als Anerkennung ihrer Beiträge zur Förderung der menschlichen Gesellschaft.

Die Verleihung des Nobelpreises in diesem Jahr ist zugleich der 51. Jahrestag der Gründung der Nobelpreisstiftung durch den schwedischen Industriellen und Wissenschaftler Alfred B. Nobel, welcher im Jahre 1896 starb, in Höhe von 9 Millionen Dollar, deren Zinsen jedes Jahr entsprechend den Satzungen denjenigen Männern zugute kommen, die als Nobelpreisträger würdig befunden werden.

In einer schlichten Feier am 10. Dezember in Stockholm, Schweden, überreichte der schwedische König Gustav VI. den Gewinnern oder ihren Vertretern den Nobelpreis 1951 in Physik, Chemie, Medizin und Literatur einschließlich der Diplome und der goldenen Medaillen. Der Barwert des Preises in jeder Disziplin beträgt 167,612 schwedische Kronen oder ungeräher 32 400 Dollar.

Der diesjährige Preis der schwedischen Akademie der Wissenschaften in Physik wurde aufgeteilt auf Sir John Cockcroft, Direktor der „Atomstadt“ Groß-Britanniens, in Harwell, und Pro-

fessor E. T. S. Walton vom Trinity College in Dublin, Irland. Die Akademie verlieh den Nobelpreis für Chemie gemeinsam Dr. Glenn T. Seaborg und Dr. Edward M. McMillan, beide von der Universität California in Berkeley. Dr. Max Theiler aus der Südafrikanischen Union erhielt den Medizin-Preis von der medizinischen Fakultät der Universität Stockholm, Schweden, verliehen, und ein schwedischer Autor, Dichter und Essayist, Par Lagerkvist, war Gewinner des Literaturpreises der Schwedischen Literarischen Akademie.

Der Friedens-Nobelpreis

Der weltberühmte Friedens-Nobelpreis wurde Leon Jouhaux, einem verdienstvollen Arbeiterführer Frankreichs am 10. Dezember in der Universität in Oslo, Norwegen, verliehen, in Gegenwart des Königs Haakon VII. und der Norwegischen Königlichen Familie. Der Gewinner des begehrten Friedenspreises wird jedes Jahr durch ein Komitee von 5 Personen gewählt, welches durch das Norwegische Parlament oder Storting bestimmt wird.

Der verstorbene Alfred B. Nobel bestimmte ausdrücklich, daß

keinerlei Rücksicht auf die Nationalität des Kandidaten genommen werden dürfte, d. h. daß der Verdienstvollste den Preis erhalten soll, einerlei, ob er ein Skandinavier sei oder nicht. Die Nobelpreisstiftung ist seither durch ein Direktorium verwaltet worden, dessen Vorsitzender von der schwedischen Regierung ernannt wird. Die Übergabe der Preise wird jedes Jahr in Stockholm und Oslo am 10. Dezember vorgenommen, der jährlichen Wiederkehr des Todestages Alfred B. Nobels.

Dr. Seaborg, Dr. MacMillan

Die Urkunden der Doctores Seaborg und McMillan, Erfinder des Plutonium, lauten: „Für Ihre Entdeckungen in der Chemie der Trans-Uranium-Elemente.“ Die Akademie erklärte die Beiträge des 39jährigen Dr. Seaborg als epochemachend und von grundlegender Bedeutung für das gesamte Gebiet der Kernforschung. Er ist Mitentdecker von weiteren vier Elementen im Zusammenhang mit dem Plutonium, welche ebenfalls unseren heutigen Wissensstand über die Atomenergie wesentlich vergrößern. Dr. Seaborg und seine Mitarbeiter entdeckten das Uranium 233, eine weitere Energiequelle, welche aus dem Thorium gemacht werden kann, welches im Küstensand enthalten ist.

Dr. MacMillan entdeckte weiterhin, daß eine gewisse Gruppe

von schweren Elementen eine Reihe bilden, welche in das System der chemischen Elemente passen. Diese Entdeckung erlaubte den Wissenschaftlern eine Voraussage über die Eigenschaften der noch nicht entdeckten Elemente in dieser neuen Elementen-Reihe. Die kalifornischen Wissenschaftler und ihre Mitarbeiter experimentierten mit kleinen Mengen von Elementen, die schwerer als Uranium sind und die in manchen Fällen den millionsten Teil einer Unze wogen und welche sie in einem Atomzertrümmerungs-Cyclotron gewannen. Vollkommen neue Instrumente und Techniken wurden für diesen neuen Wissenszweig erfunden, der heute als Ultramicrochemie bekannt ist.

Dr. MacMillan, ein Mitentdecker des Neptuniums, des ersten Elementes schwerer als Uranium, ermöglichte es den Wissenschaftlern der Welt, die Wirkungsweise der Atomzertrümmerungs-Cyclotrone zu verzehnfachen und zum erstenmal durch Menschenhand erzeugte kosmische Strahlen in ihren eigenen Laboratorien zur Wirkung zu bringen.

Sir John, Prof. Walton

Durch Verleihung des Physikpreises ehrte die schwedische Akademie der Wissenschaften Sir John Cockcroft und Prof. Walton für ihre „Pionierarbeit bei Umwandlung von Atomker-

nen durch künstlich beschleunigte Atomteile“. In Zusammenarbeit an der Cambridge Universität im Jahre 1932 bauten diese beiden Kern-Physiker einen Elektronen-Beschleuniger, den Accelerator. Vorgänger des modernen Cyclotrons, mit welchem sie in der Lage waren, Helium-Atom in Lithium und Wasserstoff aufzuspalten. Dadurch zeigten sie den Weg für den heutigen Stand der Atomwissenschaft. Als Groß-Britanniens berühmtester Pionier wurde Sir John zum Vorsitzenden der nationalen Luftverteidigungsforschung im Jahre 1939 ernannt und war verantwortlich für die Entwicklung der gesamten Radar-Überwachungsanlagen, welche zur Feststellung der Bomber-Einflugwege verwendet wurden. Bereits im Jahre 1940 erklärte er seiner Regierung, daß der Bau von Atombomben möglich wäre. Er wurde zum Direktor der Kanadischen Atomenergie-Gesellschaft im Jahre 1944 ernannt und leitete im Jahre 1946 das Harwell-Atom-Projekt in Großbritannien in die Wege. Diesen Posten wird er im nächsten Jahre aufgeben, um Groß-Britanniens erster Berater in Fragen der wissenschaftlichen Forschung zu werden.

Dr. Theiler

Der 52jährige, in Südafrika geborene Dr. Max Theiler

(Fortsetzung auf Seite 11)

Sieben Nobelpreisträger fördern die Menschheit

(Fortsetzung von Seite 5)

von der Rockefeller-Stiftung in New York gewann den Nobelpreis in Medizin für die Erfindung des ersten wirksamen Impfstoffes gegen das Gelbfieber. Dieser Impfstoff wurde während des 2. Weltkrieges eingesetzt, um Millionen von Soldaten gegen diese fürchterliche Krankheit immun zu machen.

Im Jahre 1949 errang Dr. Theiler den Lasker-Preis der amerikanischen Hygiene-Gesellschaft für die Entwicklung zweier Impfstoffe gegen Gelbfieber. Er ist Verfasser von vielen bekannten wissenschaftlichen und medizinischen Abhandlungen über Tropenkrankheiten, Amelbiasis, Leptosira, Pest, Trypanosomiasis, Gelbfieber, Poliomyelitis und Malaria. Dr. Theiler ist Direktor der Laboratorien der medizinischen Abteilung und der Hygieneabteilung der Rockefeller-Stiftung in New York.

Par Lagerkvist

Par Lagerkvist, ein weitbekannter schwedischer Dichter und Philosoph, gewann den Literaturpreis für seine populäre Novelle „Barabbas“, welche schildert, was Barabbas, dem freigelassenen Übeltäter widerfuhr, nachdem Jesus gekreuzigt worden war. Herr Lagerkvist ist Mitglied der schwedischen Akademie der Literatur.

Er wurde in Süd-Schweden 1891 geboren und erhielt seine Erziehung in Dänemark und Frankreich. Er ist der vierte schwedische Dichter, der diesen höchst begehrten Preis erwarb. Frühere Nobelpreisträger für Literatur in Schweden waren: Selma Lagerlöf im Jahre 1909, Verner von Hei-

denstram im Jahre 1916 und Erik Axel Karlfeldt im Jahre 1931. Der Novellist Lagerkvist ist der vielseitigste Gewinner, denn er hat mehr als 35 Bücher auf seinem Konto. Er ist in der schwedischen und skandinavischen Literatur weltberühmt als ein Dichter, Essayist, Dramatiker und Novellist. 1940 wurde er in den Kreis der 16 „Unsterblichen“ der schwedischen Akademie für Literatur aufgenommen.

Herr Lagerkvist ist einzigartig unter den schwedischen Schriftstellern. Er ist überragend als eine Geistesgröße und bekannter Schriftsteller, welcher sich in erster Linie mit den letzten Fragen von Kunst und Religion befaßt.

Leon Jouhaux

Bekannt unter dem Namen des Großen alten Mannes der europäischen Arbeiterschaft, wurde Frankreichs Leon Jouhaux mit dem Nobel-Friedenspreis 1951 belohnt für seinen beharrlichen Kampf für Frieden und Arbeit. Er war ein Mitgründer der internationalen Arbeitsorganisation auf der Pariser Friedenskonferenz und organisierte später die Arbeitsföderation in Frankreich. 1947 verließ er die pro-kommunistische Föderation und gründete die „Force Ouvriere“ als nicht-kommunistische Gewerkschaftsbewegung mit dem Ziel der Befriedung der französischen Arbeiterklasse.

Alle lebenden Empfänger des Nobel-Friedenspreises waren in Oslo eingeladen, um der diesjährigen Verleihung beizuwohnen. Letztes Jahr wurde der Preis Dr. Ralph J. Bunche von den Vereinigten Staaten verliehen und im Jahre 1949 erhielt ihn der eng-



LEON JOUHAUX
Frankreich



MAX THEILER
Südafrika



PAR LAGERKVIST
Schweden



E. M. McMILLAN
Vereinigte Staaten



G. T. SEABORG
Vereinigte Staaten



J. COCKCROFT
Groß-Britannien



E. T. S. WALTON
Irland

lische Lord Earl Boyd-Orr. Im ersten Nobelpreis-Jahr 1901 ging der Friedenspreis gemeinsam an Henri Dunant, Schweiz, und Frederick Passy, Frankreich. Seit dieser Zeit wurden 40 Friedenspreise verliehen, von denen 34 an Perso-

nen und 6 an Organisationen oder Institute gingen. Bei 10 Gelegenheiten wurde kein Friedenspreis verliehen.

Der Nobelpreis 1947 wurde geteilt von American Friends Service Committee (Quäker) und British Friends Service Council. 1917 und 1944 erhielt das Internationale Rote Kreuz in Genf den

Preis. Unter den Gewinnern der letzten 50 Jahre befinden sich Theodore Roosevelt, Vereinigte Staaten, Louis Renault, Frankreich, Fridtjof Nansen, Norwegen, Gustav Stresemann, Deutschland, Carlos de S. Lamas, Argentinien, A. H. Fried, Australien, E. T. Moneta, Italien und Lars O. J. Soderblom, Schweden.

Känd atomforskare på besök hos släktingar i Grängesberg,

Hällefors och Kopparberg

Grängesberg hade ett ganska celebrert besök på söndagen; den berömda och namnkunniga atomforskaren vid Berklevuniversitetet i Kalifornien Glenn T. Seaborg. Men det var inget officiellt besök, utan utslutande tillkommet för att se moderns fädernehem Grängesberg, Lisselmågstorpet 1, där modern växt upp, samt besöka släktingar, en morbror, Verner Adolfsson i Majens, samt andra släktingar och släkt med släkten. Att gruvförvaltningen och dess chef W. Fredenberg också tog hand om mr Seaborg, visade honom samhället och inbjöd honom att bo på Tjänstemannamässan var en hövlighetsbetygelse, som mr Seaborg högt uppskattade och värdesatte.

Mr Seaborg skulle ha kommit till Grängesberg redan på lördagen, men blev försenad på grund av besök i Hällefors — faderns hembygd, — där Helleforsbolaget också visade honom stor vänlighet, ävensom vid besök hos släktingar i Kopparberg, där han har en annan morbror, Karl Adolfsson, som är anställd vid järnvägsverkstaden och som jämte sin fru var med mr Seaborg hit till Grängesberg. Mr Seaborgs föräldrar, Teodor och Selma Seaborg, gjorde besök i Hällefors, Kopparberg och Grängesberg under förra sommaren.

Mr Glenn T. Seaborg, som är endast 33 år, samt lång och mörklagd, var under kriget en av USA:s främsta atomforskare och kan ta äran åt sig att ha upptäckt plutonium. Han talar och förtalar svenska ganska bra. Nu har han varit i Sverige omkring en vecka och var bland annat en av hedersgästerna vid IVAS (Ingenjörsvetenskapsakademiens) årshögtid i måndags i Stockholm. Han har föreläst eller kommer att föreläsa i Stockholm, Uppsala, Lund och Göteborg. Flykten av sverigevistelsen är nu gången och från sitt grängesbergsbesök reste han idag på morgonen närmast till Göteborg.

Hans vetenskapliga gebit är kärnkemin. Efter plutoniums upptäckt strävar den unge mannen energiskt vidare och studerar just nu de övriga s. k. transuranerna, d. v. s. nyupptäckta grundämnen, tyngre än uran. Detta arbete är betydelsefullt, då det bl. a. klarlägger atomkärnornas byggnad.

När vår grängesbergsred. på söndagen lyckades få ett samtal med prof. Seaborg berättade han med största tillmötesgående om sin sverigevistelse och besöket hos släktingarna, såväl på moderns som på faderns sida. Han medförde från sin Sverigevistelse de allra bästa intryck. Sverige var ett "gott" land och mötet med släktingarna här hemma hade givetvis glatt honom alldeles särskilt. Ifråga om atomforskningen och de märkliga resultat till vilka man redan kommit och fortfarande kommer vilte han livligt tro och hoppas att denna forskning i framtiden skulle få en alltmåra fredlig inriktning och alltså komma mänskligheten till godo, inte i krigets utan i fredens och uppbyggnadsarbetets tjänst.

Arbetet vid Berkleyuniversitetet, som förefaller vara ett speciellt hemvist för de flesta atomforskare, väntas inom fem år ge ännu mer fascinerande resultat, då världens största cirkeltron på sex miljoner volt blir klar. Hitills har man arbetat med den i och för sig imponerande spänningen av 350 milj. volt, meddelade Seaborg.

Han var mycket förtjust över detta sitt första sverigebesök och hade också många erkännansamma ord att säga om gruvsamhället Grängesberg och den moderna industriella utvecklingen där.

Minnen från Grängesberg

Det är intressant att läsa i tidningen om de som skriver om olika platser i Sverige, men jag har ännu ej läst någonting om Grängesberg. Det var en "A. B.-d" som skriver om en trekantig gråbergsten, som blev rest till ett minne vid en gruva i Bergslagen. Han säger inte var den gruvan var belägen men den måste troligtvis inte vara långt från Grängesberg. Jag är född i Grängesberg i Granlundskasernen och uppväxt där. Sedan flyttade vi och bodde på Marnäsbacken. Det var en smedja där som bolaget har använt i många år. De byggde en ny verkstad strax nedanför badhuset, så när de flyttade till den nya verkstaden, så gjorde de boningshus av den gamla smedjan, så vi fick en tvärums-lägenhet där.

Min far arbetade i Marnäsgruvan. Han var gruvbyggare och trimrade upp bergväggarna i gruvan samt högg fyrkantiga banstockar, som användes för hissen som gick ner i gruvan, och gjorde allt annat arbete som hörde till gruvbygget. Det fanns inget sågverk där på den tiden, så allting måste arbetas för hand. Det var hårt arbete och litet betalt. Min far hade tio öre i timmen. Det var svältlön på den tiden. Också arbetade han 12 timmar om dagen. Men det är ju stor skillnad på förr och nu.

Senare blev min far pumpvaktare i Marnäsgruvan. På den tiden hade de pumpar gjorda av trä eller timmerstockar, som var utborrade och användes att pumpa vattnet upp ur gruvan. De var 25 till 30 fot långa. De pumpade vattnet upp i en ho. Där var en tank gjord av trä. Sedan måste de ha en annan pump och pumpade vattnet vidare till en annan ho, och så undan för undan. Om en int-

arbetade, så kom inget vatten upp ur gruvan, utan det forssade ner tillbaka. Pumparna var dragna av en "konsta", som drogs av ett vattenhjul som ständigt måste arbeta för att få vattnet upp ur gruvan. Nu var det så att pumparna måste ses till dagligen eller åtminstone varannan dag, så när det var två helgdagar brukade farsgubben gå ner i gruvan på stegarna som gick emellan konsta, och så upp igen från det djupet som var över 1000 fot. Det var riskabelt, för det var mycket som kunde hända, och så var han genomblöt när han kom upp, och på vintern var det farligast.

Bolaget styrde om att han fick åka ner i gruvan i hissen som de använde dagligen för att köra berget upp ur gruvan. På sön- och helgdagar stod den stilla när ingen arbetade i gruvan. De hade en spelstyrare i maskinhuset som kallades Evas Oskar. Modern hette Eva, så han brukade säga: — "Alla äro vi Adams barn men jag är Evas gosse." När det var jul eller andra helgdagar som hade två vilodagar i rad måste far åka ner i gruvan för att se efter att allting fungerade som det skulle göra. Då körde Evas Oskar hissen som gick upp och ner i gruvan. Jag brukade åka ner med farsgubben i gruvan, för mor var mera tryggad när hon visste att han ej var ensam. Det var underligt att vara där nere. Det var så dystert och mörkt. Allt man hade var en gruvlampa med fotogen i som man fick lysa sej med. Vattnet sipprade fram här och där. Det rasslade och tasslade. Om man sade någonting, så gav det eko i hela gruvan. Längre fram blev det hela ett minne blott, ty de fick elektriska metallpumpar.

När min far arbetade som gruvbyggare hade han en arbetskamrat som hette Adolf Erickson. De kallade honom för Adel Ersä. Han bodde i Rålinje Asen, Öintorp. Han hade en dotter som var ungefär i min ålder, kanske något yngre. Hon reste hit till Amerika, till Ishpeming, Michigan. Där gifte hon sig med Theodor Seaborg. De fick en son Glenn T. Seaborg, som är professor vid University of California. Han fick nobelpriset i Stockholm i december 1951. Så man vet ej vad det kan bli av en som härstammar från Grängesberg eller någon annan plats i Sverige. Vi kan känna oss stolta över vår vaggastod i Sverige.

Insänder en check för förnyande av tidningen för ännu ett år, har haft den nu i 45 år. Ett tack till redaktionen och alla som hjälper till att göra tidningen intressant. Kan skriva om kyrkklockorna i gruvan nästa gång, om det intresserar.

Anton Helm.
den 5 VIGDE
dec 1940
— Järnvägsverkstadsarb. Bengt Olov Adolfsson och Britta Elisabet Edvinsson, båda från Kopparberg.



FÖRLOVADE

BENGT ADOLFSSON
BRITTA EDVINSSON

Kopparberg den 27 okt. 1945.

GÖSTA ADOLFSSON
IERNE FREDRIKSSON

Kopparberg.
Midsommarafton 1950.

LARS ARLEBY
MAJ-BRITT ÖHLSSON

Midsommarafton 1950.

LYSNING.
I Ljunarsbergs kyrka för välgörlekstadsarb. Bengt Olov Adolfsson, stg 263 C och Britta Elisabet Edvinsson, Konstbacken t. 6.



San Francisco Examiner—International
CHEMISTS MCMILLAN & SEABORG

Nobelmen of 1951 *TIME*

11/26/51

The Swedish Academy of Science took full note of the Atomic Age this year with its Nobel Prize awards. Both physics and chemistry prizes went to key figures in the early developments of the new scientific era.

¶ The physics prize was divided between Britain's Sir John D. Cockcroft and Ulsterman E.T.S. Walton. Working as a team at Cambridge, England, they built a high-voltage machine in 1932, seven years before the discovery of uranium fission, which smashed lithium atoms, turning each into two helium nuclei and a powerful jolt of energy. The Cockcroft-Walton reaction is inefficient, but the energy that

it produces is genuinely nuclear, released when mass is turned into energy.

¶ Sharers of the chemistry prize were the University of California's Edwin M. McMillan and Glenn T. Seaborg. Both were leaders of teams that synthesized the "transuranian elements," *i.e.*, elements heavier than uranium (atomic number 92). First made was neptunium (No. 93), which McMillan named after the planet just outside Uranus. Neptunium turns spontaneously into plutonium (No. 94), used in atom bombs. The other transuranian elements, also produced for the first time at Berkeley: americium (No. 95), curium (No. 96), berkelium (No. 97) and californium (No. 98).

Nobelists of 1951

NEWSWEEK
11/26/51

Firecracker fusillades shattered the calm of Gilman Hall on the University of California's Berkeley campus last week. Students whooped it up in celebration of a long-anticipated event. This year's Nobel Prize in chemistry had gone to two of Cal's brilliant young atomic scientists, Glenn Theodore Seaborg, 39, and physicist Edwin Mattison McMillan, 44.

In 1940 Seaborg and McMillan had helped to usher in the atomic age. Both were members of the scientific team

His scores range closely with the numbers of the elements which he has discovered. Nevertheless, in vying with his associates for a coveted trophy—a 10-year-old stick of chewing gum of inestimable symbolic worth—Glenn manages well, thanks largely to Gamesmanship.*

The 1951 Nobel Prizes in science were swept clean by atomic scientists. A Briton and an Irishman, Profs. John Douglas Cockcroft, 54, and Ernest Thomas Sinton Walton, 48, shared the award in physics. Like McMillan and Seaborg, each will get about \$16,180.

In the 1920s, before the cyclotron was



Associated Press

Ed McMillan and Glenn Seaborg: Atomic science scored a clean sweep

which discovered the artificial element No. 94, plutonium, the A-bomb fuel. Earlier in the year, McMillan had collaborated in the discovery of No. 93, neptunium, plutonium's predecessor. And Seaborg headed research projects that made four other synthetic elements, americium, curium, berkelium, and californium, numbers 95, 96, 97, and 98.

McMillan also invented the synchrotron and synchrocyclotron, today's highest powered atom-smashing machines.

Ed McMillan, who grew up in Pasadena, Calif., is a quiet and reflective man, given to pattering around the home and garden. As a youth he took up mountain climbing and once on a tour of Europe scaled the formidable cliffs of the Matterhorn. In a desultory way he collects minerals which he picks up on hikes.

Glenn Seaborg, though noted for his modesty, is more outgoing. At 12, soon after moving to South Gate, Calif., from Ishpeming, Mich., he achieved a local reputation as a marbles shooter. But later he abandoned that sport in favor of golf.

born, Cockcroft and Walton had smashed atoms with high voltages at Cambridge University. While working on radar during the war, Cockcroft on three days' notice hustled to Canada to become head of the Canadian atomic-energy project at Chalk River, Ont. In 1946, he returned to England to set up and direct Britain's main atomic-energy plant at Harwell. Walton is now a professor at Trinity College in Dublin.



DR. GLENN SEABORG

S. G. Scientist in New Discovery

Dr. Glenn T. Seaborg, son of Mr. and Mrs. H. T. Seaborg of 9237 San Antonio avenue, South Gate, already noted in atomic research and co-discoverer of three elements in chemistry, has chalked up a new achievement, The Associated Press in Berkeley said today.

Dr. Seaborg, who attended Victoria Avenue school as a child, is one of four University of California scientists who today announced discovery of another new element, a strange, invisible substance which seems to fit dramatically into the jigsaw puzzle of creation. It does not now exist naturally on earth, but may have for a few fleeting minutes "in the beginning" when matter was formed.

Dr. Seaborg was associated in the discovery of Element Number 93, neptunium; Number 95, americium, and Number 96, curium. The name of "californium" has been suggested for the new element.

No. 98 has no future as a source of atomic energy, the Associated Press quoted Dr. Seaborg as saying, but it adds to man's understanding of matter.

Atomic Fuel for Power Use Far Off, Says U.C. Savant

NEW YORK, Dec. 3.—(AP)—Coal at least 20 years, says Nobel and water power won't have Prize winner Dr. Glenn T. Seaborg competition from atomic fuel for

The University of California chemistry professor who discovered plutonium, talked to newsmen yesterday before leaving by plane for Stockholm, where he will receive the Nobel award December 10.

Seaborg said atomic energy already is being put to important practical uses as radioactive trac-

ers for measuring movements and activity of various elements.

He said he believed this use "will be of greater importance than atomic power itself."

Seaborg was co-winner of this year's Nobel Prize for science. The other recipient is Dr. Edwin M. McMillan, a physicist at the same university.

Nobel Prizes Awarded at Stockholm, Oslo Meetings

S.F. CHRONICLE

STOCKHOLM, Dec. 10 (AP)—Five scientists from the United States, Britain and Ireland and a Swedish novelist received their 1951 Nobel prizes from the hand of King Gustaf at a ceremony in regally decorated Concert Hall tonight.

In Oslo, at a similar ceremony, the French labor leader, 72-year-old Leon Jouhaux, received his peace prize. Each of the prizes was worth \$32,357.62. The chemistry and physics prizes were divided.

The winners were:

Medicine — Dr. Max Theiller, 51, of New York, a native of South Africa, who developed the first effective vaccine against yellow fever.

Chemistry — Two Americans, Dr. Glenn T. Seaborg and Dr. Edwin M. McMillan of the University of California at Berkeley. They are the co-discoverers of plutonium.

the element that made the atom bomb easier and cheaper to produce, and other elements.

Physics — Shared by Sir John Cockcroft, director of Britain's Harwell Atomic Research Center, and Professor E. T. S. Walton of Dublin's Trinity College in Ireland.

Literature — Par Lagerkvist, whose novel, "Barabbas," is high on the U. S. best-seller list.

STOCKHOLM BJÖD
LUCIA STORA FÄMNER
Nobelpristagare hyllningstalade
på klingande dalamål
USA-CHARM KRING LUCIA



Folkhav utan like i jubel
kantade Luciatågets väg

Släktkärleken blommade när Seaborg gjorde visit

Seaborgsmannen
Nobel 6/12-1951
amerikafrämmande

Nobelpristagaren, professor Glenn Seaborg med fru Helen samt morbrodern Carl Adolffson och dennes fru Jenny från Kopparberg uppenbarade sig hastigt i Grängesberg på torsdagsförmiddagen. Besöket var tydligen menat vara helt officieellt men det lyckades inte alldeles. De kom med riksbusen kl. 10 och dröck förmiddagskaffe hos släktingar på Örnorpp samt återreste till Kopparberg sedan med nedgående riksbusen kl. 12.05.

en liten rond till uthusen. Han ville tydligen ingenting förglömma.

Blommor från kommunen.

Så följde därefter samling i Summerbyska hemmet där också V. G. Adamsson och fru Emma Adamsson hade infunnit sig. Under tiden hade meddelandet om professorsparets grängesbesök spritt sig och flaggorna gick i topp på både gruvlavarna och stängerna vid bostäderna runt om i samhället. Just som kaffet skulle intas infann sig två representanter för Grängärde kommun, kommunalfullmäktiges ordförande Martin Eriksson och kommunalnämndens ordförande A. Hjort. Den försnämnde framförde en hälsning och lyckönskning till Grängesbergsättlingen. Blommor överlämnades också och Martin Eriksson riktade även några ord på engelska, till fru Seaborg. Från disponent och fru Fredenberg hade översänts vackra orkidéer och från G. Sunnerby med fru överlämnades ett vackert frukktår i trä, eget arbete av Sunnerby.

Många fick autografer.

Som många gånger framhållits i tidningarna är professor Seaborg en man med många charmerande egenskaper, enkel, flärdfri, humoristisk och släktkär. Vi kan tillägga ännu en — barnkär. Det kom barn som hade sett bilder av nobelpristagaren i tidningarna och bad att få komma in och se honom i verkligheten. Och det fick de naturligtvis. Utanför väntade också en del barn för att få autografer. Professorn skojade och sa att det kostade mycket pengar och frågade om de hade några sådana med sig. Det var dåligt med den saken med autografer fick de alltså sammans.

Förresten omtalades att en elvaårig grabb i Kopparberg fått en intervju med nobelpristagaren. Pojken kom med block och pennan och hade elva frågor uppskrivna, bl. a. vad tycker en nobelpristagare om Sveriges barn? Intervju fick han som sagt och den skall införas i en liten tillfällighetstidning som eleverna i skolan ger ut till julen. Den pojken blir nog den verkliga journalisten med tiden!

Professor och fru Seaborg avreste på torsdagskvällen från Kopparberg till Stockholm. Möjligen kommer Seaborg till Sverige 1953 men därom var ännu ingenting bestämt.

Sverker.



Nobelpristagaren, prof. Glenn Seaborg, med modern, fru Jenny Adolffson och sin fru Helen.



HAN MÅSTE HA ATOMKRAFT i armarna, konstaterar Carl Adolffson när han bryter arm med nobelpristagaren Glenn Seaborg (t. v.).

Professor med atomkraft i armarna

UDVIKA (ABD) Med ett rejält svenskt "Hejlan gubbar" kläckte nobelpristagaren, professor Glenn Seaborg, av taget sent i går kväll i Kopparberg och togs emot av en massa släktingar från Bergslagen och Dalarna. Det blev glädjekramar till höger och vänster och professors moster och morbror, grängesbergaren Jenny och Carl Adolffson, som mötte redan i Eröv, hade svårt att hålla tårarna tillbaka. *5/12 1951 Aftonbladet*

Professorn hälsade glatt på släktingarna och sedan vidtog en stor skatt- och bullfest i makarna Adolffsons hem. Där tog också Kopparbergs köpings ordförande, redaktör Helge Lindquist emot och lämnade blommor till makarna Seaborg. Makarna Seaborg stannar i Kopparberg t. o. m. torsdag och i dag skall de göra en avstic-karp till Grängesberg, där de skall tillta på professor Seaborgs morföräldrars hem. Det är också mycket stroligt, att de får under jorden och tar en titt på gruvdriften.

En Adolffson har pyntat och fejat litet extra de senaste dagarna och nu tar en massa andra bestyr vid. Makarna Adolffson skall ju med på nobelfesten som professor Seaborgs gäster och det skall vara litet av varje i klädväx som skall ordnas till den dagen. Fru Seaborg, förklarade, att hon ser fram med stor spänning till luciasfirandet i Stockholm.

— En luciafest har vi aldrig tidigare varit med om, men jag har hört mor och far berättat om luciafesterna som brukade anordnas i Hällefors och Grängesberg berättar professor.

Det är egentligen bara en så som han inte gillar, nämligen det svenska brännvinet. Trivsämhet blommade i det adolffsonska hemmet i går kväll och Adolffson och fru Seaborg stökade till i strumpor och Kalle Adolffson bröt arm med sin systerson, professor. Den sistnämnde vann och Adolffson påskade då på skämt, att "han hade väl atomkraft i armarna".

Kopparberg tog farväl av Seaborg

Nobelpristagaren Glenn Seaborg och hans maka återvände på torsdagsförmiddagen till Stockholm från tvådagarsbesöket i Kopparberg. På vägen gjorde de ett uppehåll i Grängesberg, där nobelpristagaren besökte sin mors gamla hem.

På fredagen skall han i Stockholm träffa inte mindre än femton släktingar, som en sekret, rare på amerikanska ambassaden på hans önskan letat upp.

Kopparberg flaggades det under onsdagen och torsdagen svenskt och amerikanskt. Mr Seaborg gjorde en av dagarna sin morbror Carl Adolffson sällskap till dennes arbetsplats, vid Oxelösund — Grängesbergsbaans järnvägsverkstäder i Kopparberg, och vidare besökte han tillsammans med hela släkten den gamla Bergslagskyrkan i Köpingen. Det visade sig att fru Seaborg också kunde tala litet svenska, men oftast måste hon ju anlita maken som tolk.

Professor Glenn T. Seaborg vid Californian universitetet i Berkeley, en av de ledande atomforskarna, har blivit vald till medlem av rådet i American Chemical Society och kommer att tjänstgöra som rådgivare i 3 Års tid. Professorn är en av upptäckarna av plutonium, som användes i atom-bomber, samt av americium och curium. Han avlade avgångs examen år 1934 och tog fil. dr. graden i samma universitet år 1937.

Californian Honored as 'Chemist of the Year'
 NEW YORK, Dec. 30. (AP) Prof. Glenn T. Seaborg of the University of California has been selected "chemist of the year" in a national poll of chemists and chemical engineers conducted by Chemical and Engineering News, publication of the American Chemical Society.



Nobelpristagaren prof. Glenn Seaborg med maka intervjuades i kaffevagnen för USA som sändes natten mellan den 9 och 10 december.

Allra först ställdes färdan till den lilla, trevliga stugan vid Lisselmågtorp, belägen strax intill Eklunds f. d. bryggeri i Rällinge-Åsen. Här har som bekant professors morföräldrar bott och hans mor växt upp innan hon emigrerade till Amerika. Stugan var ganska välbesökt av släktingar redan innan professorsparet och deras kopparbergs släktingar samt de mötande släktingarna vid järnvägsstationen anände. Det blev åtskilligt överdussin när alla blev samlade. Bl. a. en hel del av släkten Lund, Lundarnas stamfader bodde på sin tid på Slantbacken. Det var fru Ebba Lund och Harald Lund med fru Amanda samt fru August Lund. De räknar släktskap på professors mors sida. Andra släktingar och släktingars släktingar var Ernfriid Nordström med dotter och liten dotterdotter och naturligtvis verk-mästaren vid snickareverkstaden Gustav Sunnerby och hans fru Margit till vars hem färdan sedan ställdes och förmiddagskaf-fet intogs under den allra glada-te stämning.

Julgåva till moster Selma.

Men först något om besöket i morfarsgården Lisselmågtorp. Detta äges numera av morbror Calle i Kopparberg och bebos av fröken Valborg Eriksson som naturligtvis också var närvarande. Mötet i den lilla stugan vittnade på ett slående sätt om den goda släktkärleken. Den unga nobelpristagaren och hans fru vann alltifrån första ögonblicket grängesläktens hjärtan. Några av dem hade ju redan för två år sedan träffat professorn men hans intagande fru hade ingen tidigare sett. Det blev ett utbyte av hälsningar och omklappningar, och små kärlekspaket i form av jul-gåvor och omkläppningar, och några att Glenn skulle överlämna dem till moster Selma i Amejka och andra släktingar där. Så det blir tydligen en hel del mer i flygplanet till USA än vid till-flygningen. Professorn gick igenom hela stugan, också det lilla rummet på andra botten där morbrodern Verner bodde. En sak som här väckte professors intresse var det grammofon som Verner Adolffson på sin tid själv förfärdigt. I detta sammanhang kan nämnas att Adolffsonarna visat prov på konstskicklighet och konstnärliga intressen. Calle Adolffson i Kopparberg har målat verkligt bra tavlor varav en del senare beundrades i det Sunnerbyska hemmet. Sedan besöket inomhus var avslutat gjorde professorn också

Kemipristagare i Bergslagen fick äktsvenskt smörgåsbord



Festmiddag för Amerikasläkten i Frövå. Från vänster fru Jenny Adolfsson, professor Glenn T. Seaborg, Nobelpristagarens morbror, hr Karl Adolfsson, och mrs Helen Seaborg.

Från Dagens Nyheters utsända medarbetare

FRÖVÅ, måndag. "Välkommen, Glenn, och här den äran!" Varmt och spontant välkomnades Nobelpristagaren Glenn T. Seaborg, när han på måndagen kom på besök till sina svenska släktingar, först sin fars släkt i Västerås, sedan sin mors i Frövå och Kopparberg. Han svarade glatt på sin barndoms Bergslagsmål. Det använde han som genomgående språk hela den — utom när han talade till fru Helen, och ibland blev det även det på svenska, med tillägget "förstår ni?" Strax rättat till "förstår du?"

Kemipristagaren togs emot som en yngre familjemedlem som varit länge borta, med rågade mått av mat smaken i Västerås med fru Ella och dryck och orolig omsorg. Du har haft tyngsligt mycket att göra? Na, Professor Seaborgs farfar, som emitturligtvis också med glad uppståndelse från Hällefors på 60-talet, delse, eftersom han kom ända från väst, bror till hr Tersmedens mem-Amerika, och med en viss stonhet. Unge herr Carl är alltså en eftersom "pojken skött sig så bra" syssling, och med litet god vilja kan Men någon nervositet över att ha ena ena nog spåra en viss likhet mellan världsbekant gäst i huset förmärket, spåde gymnasisten i eldröd sligt och den kraftige vetenskaps-mannen i blå slipover. Men hur är det, med kemii i skolan?



Professor Glenn T. Seaborg påbörjar det svenska sparkföret, skjutsad av sin syssling Carl Tersmeden i Västerås.

Mjaa, jag läser inte kemi nu, svarar Carl undvikande. Aspirerar tydligen inte på Nobelpris i den branschen. Men har så mycket att tala om. Först framförs förstas hälsningar från peppa och mamma Seaborg, sen från många andra. Den kusinen mär bra, och den, och den. Någon har också hunnit dö sedan Glenn var här senast, för två år sedan. Hr Tersmeden har ett tjog kusiner i Amerika, och släktkärleken är stor — kaffepaketet droppade tätt under ransneringen. Under samtalets gång sitter mrs Seaborg och tittar sig omkring, på det svenska hemmet. Hon försöker följa med i konversationen så gott det går, med loenden mest. Då och då tolkar hennes man en mening för henne, och hon nickar förstående. I Frövå, dit paret Seaborg kom några timmar senare, väntade en hel hop släktingar. På stationen mötte professorns morbror från Kopparberg, verkstadsarbetare Karl Adolfsson, och hans fru Jenny. Tillsammans för man sedan till en äktsvenskt röd stuga med vita knutar, där familjen Karl Norén dukat upp till lika äktsvensk festmiddag med för den skull vara modern halv-syster. Så var där hennes man, 73-åriga f. lokföraren Karl Norén, och hennes dotter och måg: mr Seaborgs morfars styvdotterdotter och styv-dottersvarson alltså. Hur enkelt som helst, ljus och överflödande smörgåsar.

— Det är så många folk här, sa hedersgästen och såg nästan litet brydd ut på tillfället. Han hade inte hunnit med Frövå under sitt förra Sverigebesök, så det var många nya ansikten på en gång. Släktskapen kunde också vara invecklad nog att hålla reda på, t. o. m. för en geni. Det tycktes vara så att fru Norén var dotter till mr Seaborgs mammas styvmor — utan, att helst för den som kan det. Och det kunde mr Seaborg.

Man klistade sig in i samtal om Amerikasläkten, här, också. Hela villan sjöng snart av ivrigt Bergslags-mål med den och annan äktsvensk accent. Det var när man kommit till värmdäcken som mr Seaborg kommit in i vanan att tala svenska att han efter en tolkning frågade sig fru: Förstår ni? På kvällen fortsatte paret Seaborg och Adolfsson till Kopparberg, där de under något längre tid får fördjupa sig i den svensk-amerikanska släktslöden och äventyr. Site

Nobelpristagaren Glenn Seaborg och hans maka återvände från tvådagarsbesöket i Kopparberg med Stockholmståget 15.30 på torsdagen, och i dag skall de träffa inte mindre än 15 släktingar i Stockholm, som en sekreterare på amerikanska ambassaden létat rätt på enligt nobelpristagarens önskan.

De har haft ett par relativt lugna dagar i Kopparberg hemma hos morbror Calle, där moster Jenny månat om den berömda släktingen och hans söta maka, vilka riktigt gonat sig i svenskt familjeliv.

I dagarna två har Kopparberg flaggat svenskt och amerikanskt och den blågula duken bredvid Stars and stripes har på sitt sätt symboliserat nationernas komman-

**Möster Selma
får julgåvor
genom Seaborg**

Nobelpristagaren Glenn Seaborg med fru kom till Gränges i går blommande släktkärleken upp i Lisselmågtorp. Det blev husesyn med inslag av många minnen, och vid kaffebordet i Örntorp kom, kommunens förtroendevänner, med blomster och samhällets flaggor Akte i topp. Glenn Seaborg får också ikläda sig uppdraget som jul-tomtens ty kära släkten i Gränges skickade med flera julgåvor till moster Selma i Amerika. Sveriges berättar om besöket på sid. 12.



Glenn Seaborg kramar om moster Jenny och hustrun just när de klev av rälsbussen i Kopparberg.

Stjärnbaner i Kopparberg byllning åt Glenn Seaborg

Just när de klev av rälsbussen i Kopparberg. BP 7/12 1951

byllning åt Glenn Seaborg

onsdag och torsdag blev som en med släkten. Det visade sig så småningom, att hon i alla fall lärt sig tala litet svenskt och förstod språket ännu bättre. Ibland hjälpte hon sig fram med en ordbok, men när inte denna heller hjälpte till ropade hon på Glenn.

Glenn och jag är inte barn-domsvänner, utan växte upp långt ifrån varandra, förklarade hon leende. Vi träffades först vid universitet i Berkeley och sedan, ja sedan gifte vi oss så fort vi bara hann med.

Åskedet vid järnvägsstationen blev lättare genom att man ju ändå snart träffas på Nobelfesten i Stockholm. Men båda makarna Seaborg tyckte ändå att det var svårt att resa så snart. De skulle ha velat stanna mycket längre här i hjärtat av Bergslagen.



Nobelpristagaren tillsammans med de tre kusinerna, fr. v. Gösta, Karin och Bengt.

SLÄKTKALAS FÖR NOBELPROFESSORN

NA 5/12 1951



Fru Gerda Norén bjuder professorsparet Seaborg att ta fröij under middagen i hemmet i Frövi. T. h. årets nobelpristagare i kemi från en annan sida, glatt skrattande under mötet med släkten i Sverige tillsammans med morbrodern Carl Adolfsson från Kopparberg.

Väggade The Svedberg Värdinna för Seaborg

Det blev stort kalas hos förre lektoraren C. W. G. Norén i Frövi i går när årets nobelpristagare i kemi, den amerikanske professorn Glenn Seaborg och hans maka Helen, gjorde ett kort besök hos sina släktingar. Det var första gången de råddes och det fanns mycket att tala om. Man har hållit kontakten uppe och det var bara tre år sedan professor Seaborgs föräldrar besökte herrskapet Norén i Frövi.

Professor Seaborg kom med taget strax före kl. 9 på eftermiddagen sedan han varit i Kopparberg där han besökt på sin morbror, verkstadsarbetaren Carl Adolfsson och dennes fru Jenny. De var också med till Frövi, och med herrskapet Noréns dotter, fru Lisa Storm, och svågern, förman Edvin Storm, blev det allt som allt åtta personer som samlades kring det festliga och smukt svenska middagbord som dagens värdinna, fru Gerda Norén, dukat fram.

Riktig släkt är nu inte Noréns med årets kemipristagare — men släkt i släkter. Fru Noréns mor gifte som änka om sig med professor Seaborgs morbror. Vidare framgår av den något invecklade släkttavlan, att mr Seaborgs mor är svyster till mr Adolfsson i Kopparberg. Men, som sagt, man har hållit kontakten uppe och känner sig som riktig släkt.

Till gemenskapsbanden bidrar att fru Norén gjorde upp gamla minnen från Seaborg till sommarska innan (Forts. på nästa sida.)

Julpremiär för Seaborg

När professorsparet Seaborg i sällskap med sina värdar under de två närmaste dagarna, morbrodern Carl Adolfsson och hans maka, anläände till dessas hem Herrhagen i Kopparberg på tisdagskvällen blev det stor uppvaktning. En av de överlämnade köpingsfullmäktigens ordf. och vice ordf., redaktör Helge Lindkvist och notarie Gillis Fahbeck, en blomsteruppsats. Värdfolket bjöd på kaffe och tårter och till stor förtjusning för de amerikanska gästerna tändes julgranen för första gången.

Opartistisk pristördelning ger goodwill åt Sverige

Nobelpristagaren Glenn Seaborg är en ungehämman man att prata med. Mycket lång, smärt, kan vid en första, hastig anblick påminna något om en boxare, fast inte i tyngsta klassen, eller snarare om en typisk amerikansk studentidrottsman med snabbhet i benen. Spänstig verkar han i varje fall, den 53-årige, värdberömda atomforskaren — han håller sig bl.a. i form med arbete i trädgården till sin nya villa i Californien. Han har ett öppet och mycket behagligt sätt och han trivdes påtagligt med umgänget med sina svenska släktingar och värdpar Norén.

Han berättade för NA-NT:s medlemmar mellan de många röttåna i det norenska hemmet i Frövi, att han glatt sig mycket över detta tillfälle att på nytt få besöka Sverige och sina släktingar här. Det är särskilt på en punkt, han vill precisera sin uppskattning av det svenska. Det gäller naturen och folket uppe i Bergslagen, där han också har sina rötter. Dit vill han gärna vända tillbaka.

Sverige är ett av de kulturellt mest avancerade länderna i världen, vill han också gärna framhålla. Han tänker då särskilt på den högtstående skoldervisningen, inte minst, har han fäst sig vid att så många svenskar också kan ett främmande språk. Programmet för den fortsatta sverigevistelsen har han ännu inte hunnit få klart. Den 12 får han ta emot onbelgudet och då skall han föreläsa om sin vetenskapliga specialitet, uranet. "Transuranium Element: Present Status" är den officiella rubriken på den föreläsningen. Vidare kommer det att bli besök vid vetenskapliga institutioner i Stockholm och Uppsala.

Dagen efter nobelfesten har han ställt sig inför en uppgift, som han ännu inte tänkt på hur han skall lösa. Han har nämligen lovat att kröna Stockholms Lucia. Lucia-traditionen har han inte haft någon kontakt med tidigare, bara hört talas om den.

Han berättar om nobelpriset. Att få denna utmärkelse innebär USA den största ära, säger han. Penningssumman är imponerande, men själva utmärkelsen som sådan skattas ännu högre. Det säger en hel del, tycks han mena, om hur högt just amerikanerna sätter hedersbevisningen i detta fall.

Professor Seaborg vill också ge svenskarna en eloge för det sättningen. Trots inbjudan från Uppsala, Lund och Göteborg blir det guldet sker — med en opartistiskhet som ger Sverige en betydande goodwill ute i världen.

Mr Seaborg har åsikter om den politiska situationen i världen just nu, men vill inte gärna avajad dem. Vad jag personligen tänker om exempelvis fredsutsikterna i Korea är ingenting att stå på i tryck, säger han. Jag tror som så många andra människor — hoppas. Han vill emellertid

gärna deklarerat sin uppfattning om den amerikanska hjälpen till Europa och om tanken på en europeisk armé. Jag tror detta är riktiga vägar, förklarar han. Professorsparet stannar hos släkten i Kopparberg t. o. m. torsdag kväll. Vistelsen i Sverige kommer sedan att vara till den 24 eller 25 december.

3 Dec 1951 Kopparberg får del av nobelglansen

Svenskättlingen och nobelpristagaren i kemi Glenn Th. Seaborg har anlänt till Sverige för att motta sin utmärkelse. Den berömda kalliforniske forskaren med världsryste har inte glömt bort sina vänner i vårt land, vilket bevisas av att han utverkat en inbjudan till sin morbror och moster, makarna Adolfsson i Kopparberg, att få närvara vid nobelfesten i Stockholm den 10 dec.

Professor Seaborg hälsade häromåret på makarna Adolfsson i Kopparberg, och nu vill han återgälda gästfriheten. Givetvis har morbror och moster i Kopparberg tackat ja till inbjudan.

Glenn Seaborg 3 Dec 1951 bygger sovrum för Nobel-Guld

New York söndag (TT) Nobelpristagaren Glenn Seaborg med maka Hög, på söndagen till Stockholm för att hämta sitt pris. För Nobelfestligheterna skall paret Seaborg besöka släktingar i Kopparberg och eventuellt i Västerås.

I en intervju med TT:s New York-korrespondent omtalar Nobelpristagaren att föräldrarna som båda lever, blev överlyckliga då de fick beskedet om sonens utmärkelse. Ett tag var det meningen att modern skulle följa med på resan till Stockholm, men den långa färden och höstvädret i Sverige avskräckte.

Under vistelsen i Sverige skall Seaborg kröna Stockholms Lucia och närvara i en festlighet i nordgenad av naturvetenskapliga föreläsningarna. Trots inbjudan från Uppsala, Lund och Göteborg blir det inga föreläsningar av nobelpristagaren, som dock hoppas återkomma i samband med den stora internationella vetenskapskongressen i Stockholm 1953.

Några bestämda planer på det gäller att hämta priset i Stockholm har familjen Seaborg inte. "Men" säger nobelpristagaren, "kanst vi bygga vårt hem med ett par sovrum för våra fyra barn".

Nobelpristagare . . .

(Forts. från första sidan.)

atomforskningen. Samtalet fördes mestadels på engelska, men då och då stack professor Seaborg in ett svar på om inte felfris så dock fullt förståelig svenska.

— Mina föräldrar kommer ju från Hällefors, berättar mr Seaborg, och min farfar bodde där en tid. Innan han flyttade till Amerika mot slutet av 1800-talet. Och fast min far är född i staterna, talar han bra svenska och även försökt lära sina barn fädernespråket.

Och även på mödernet har jag rötter här i landet: min moder är född i Grängesberg, så om det märks något av bergslagsdialekt i min stapplande svenska är det fullt förståeligt. Dock måste jag säga, att jag förstär ett språk rätt väl, åtminstone om det talas långsamt, men jag har svårare att uttrycka mig på mina faders teungomål.

— Det är inte Ert första besök i Sverige?

— Nej, jag var här för två år sedan, då jag höll en serie föreläsningar vid olika vetenskapliga institutioner, så jag känner Sverige och svenskarna åtminstone någorlunda vid det här laget. Och jag trivs förträffligt här.

— Om jag skulle ha något emot att stanna och fortsätta arbetet i Sverige? Nej, det skulle jag nog inte, men forskningsmöjligheterna är nog större vid California University i Berkeley, där jag har allt vad jag kan önska ifråga om anslag, apparatur och assistens av goda vänner.

GOLF SOM HOBBY.

— Och vad skal professorn roa sig med i Kopparberg?

— Vila upp mig och idka familjeliv, helt enkelt. Mina två hobbies är annars golf och trädgårdsskötsel, men det är ju förstrelser som inte precis lämpar sig för den här årstiden, så jag får som sagt ta igen mig. Och det kan ju vara skönt, det också, ty uppriktigt sagt har laboratoriarbetet varit pressande på sista tiden.

Det arbete, som professor Seaborg sysslar med ligger ju på ett tekniskt plan som sträcker sig över vanliga människors horisont, och han går inte heller gärna in på vetenskapliga detaljer. Så mycket poängterar han emellertid, att det stora målet är att utnyttja atomenergin i fredens tjänst. Han tvivlar dock på att denna energi på länge kan komma till verkligt praktiskt bruk för industrins och samfärdselns del.

För läkarvetenskapen kan det dock tänkas, att den radioaktiva energin kan användas som s. k. spårämne, d. v. s. man kan med dess hjälp följa processer i kroppen, blodcirkulationen m. m.

Och därmed säger vi farväl till den sympatiska professorn, som huggar in med bly på syltan och leverpastejen. Senare på kvällen skall resan fortsätta till Kopparberg, och efter två dagars vistelse där, skall man försöka hinna med även en visit i Hällefors. Innan det är klart för återfärd till Stockholm och Nobelhögtidigheterna.

MÅNGA KOPPARBERGARE MÖTTE

När professor Seaborg vid tiden på tisdagskvällen anlände till Kopparberg med tåget i sällskap med sina släktingar makarna Karl Johan och Jenny Adolfsson, Kopparberg, var en ansevärd skara kopparbergare med ytterligare ett 10-tal släktingar i spetsen som väntade på att få hälsa paret Seaborg välkomna.

Färden ställdes omgående till det adolfssonska hemmet. Här uppväntade Kopparbergs köping genom köpingsfullmäktiges ordförande Helge Lindqvist samt notarie Gillis Fahlebeck och hälsade gästerna välkomna samt gratulerade professor Seaborg till Nobelpriset. Till fru Seaborg överlämnades en vacker blomsteruppsats vilken hon omgående delade med sin make. Här efter bjöds det på kvällskaffe i adolfssonska hemmet och de långväga gästerna lät sig väl smaka av det hembakta bröd och kakor som bjöds.

På sitt chesefria sätt tog sig professorn Seaborg här en pratstund med sina anhöriga om bl. a. minnen från sitt tidigare besök i Kopparberg för drygt två år sedan samt hur man skulle ordna det under vistelsen i Sverige. Bl. a. berättade han att hans moder, som är född i Grängesberg, nog hade önskat att få följa med till gamla Sverige ett slag, men att hon ej trodde sig orka med den dryga resan och så var det även den kalla vintern som avskräckte.

Paret Seaborg förretar återresan till Stockholm och Nobelfestligheterna på torsdagskvällen och under sin vistelse i Kopparberg kommer de även att göra ett besök i Grängesberg för att hälsa på släktingar där samt besöka professor Seaborgs moders födelseort. K. J. Adolfsson med fru, söner Bengt och Gösta Adolfsson samt dottern Karin Möller var synbarligen glada över återseendet och särskilt åt att mrs Seaborg denna gång var med. Makarna Adolfsson, som inbjudits till Nobelfestligheterna, reser till Stockholm på måndag för att övervara dessa.

LYSNING

1951
GÖSTA ADOLFSSON
IRENE FREDRIKSSON
Kopparberg.

LYSNINGAR

— I Ljusnarsbergs kyrka för kontorsbiträdet Gösta Adolfsson och fru Irene Fredriksson, båda från Kopparberg.

Mr Glenn Seaborg talade

ST svenska, på släkträffen

5/12 1951

Stora famnen för Seaborg

B.P. 5/12 51
vid träffen i Kopparberg

Nobelpristagaren Glenn Seaborg och hans maka Helen togs emot med stora famnen av släkten när de tillsammans med morbrodern Carl Adolfsson och hans hustru steg av TGOJ-rälsbussen på Kopparbergs station. Professorn gav stora kramen åt kusin Karin Möller och handhälsade hjärtligt med de övriga innan han snällt, vände sig till pressfoto-grafernas förfogande. En mängd bilar förde sedan sällskapet upp till villan i Herrnagen där köpingsfullmäktiges ordförande Helge Lindqvist och v. ordföranden notarien Gillis Fahlebeck hälsade dem välkomna och överlämnade en bukett crysantemum till både professorn och hans maka. Sedan blev det ytterligare fotografiering.

Allt vad som sagts om att professorn är en enkel och naturlig amerikan stämmer in precis. Han har skarpt markerade drag och fast han säkert liksom sin hustru var trött efter den långa resan och allt vad som hänt sedan de satt foten på svensk jord så svarade han villigt och med ett glatt leende på alla frågor. Efter middagsmålet i Prävi visade dock varken han eller mrs Seaborg någon aptit på kaffebrödet med alla sju sorterna, allsammans hembakat, men smakade på tårtan som mrs Seaborg fann verkligt "nice". De satte också stort värde på att herrhagsborna startat samma dag, med den stora julgranen, vars många lampor lyste upp utåt det adolfssonska hemmet.

Hur tyckte barnen om att pappa och mamma reste så långt bort, frågade vi mrs Seaborg. De är så små att de inte förstod riktigt vad det var fråga om mer än att det var något roligt som hänt oss. Vår äldste är ju bara fem år. De har det också bra, alla fyra hos goda vänner till oss men jag längtar redan efter dem. Vad jag tycker om Sverige? Oh, det är så vackert, det vi hittills sett. Det är ju mitt första besök i Sverige men jag har sett så många bilder från Bergslagen hemma hos Glenns föräldrar.

Professor Seaborg berättade att det varit på tal om att hans mor skulle följa med på Sverige-trippen. Det blev inte av därför att hon minns från sin ungdom hur kallt det kan vara här i december och hon är ju ändå snart 65 år.

Besöket i Kopparberg blir inte så långt. I dag planeras en resa till Grängesberg — men det är inte så säkert, inflikar Carl Adolfsson — och på torsdag kväll reser gästerna tillbaka till Stockholm där ett drygt program ligger framför dem.

— Hur känns det att träffa kungen?
— Det blir säkert intressant. Vi är inbjudna till slottet på middag om tisdag.

— Professorn ämnar inte hålla några föreläsningar under detta besök, sägs det i tidningarna?

— Endast Nobelrådet, som jag håller på engelska och kallar The transuranium elements; present status, men när jag återkommer till Sverige på en stor vetenskaplig kongress 1953 så har jag lovat flera.

PÅ SEKUNDEN SAMTIDIGT I KOPPARBERG OCH BERKELEY

Faktiskt i samma sekund nådde budet om Nobelpriset fram till professor Seaborg i Berkeley och till morbror Carl Adolfsson i Kopparberg. Kl. 12.35 ringde telefonen hemma hos professorn och kl. 21.36 hos morbrodern, och det skiljer nio timmar på svensk och amerikansk tid. Det var en tidning i Stockholm som ringde upp båda för att gratulera och göra en intervju bara någon minut efter beslutet.

Det hade verkligen förekommit uppgifter i amerikanska tidningar om att jag skulle ha goda chanser, men själv trodde jag det inte. Därför kom det ändå som en stor och glad överraskning och vi var genast överens om att min hustru skulle följa med på resan.

Herrskapet Seaborg skall också ta tillfället i akt att besöka Paris och London och från sistnämnda plats reser de den 19 för att vara framme i San Francisco den 20 december.

Vigde

— Kontorsbiträdet Karl Gösta Adolfsson och Irene Elisabet Fredriksson, båda från Eskilstuna, 1951
— Påskafton

Tre släktmöten i rad ST.T. 5/2 1957 för nobelpristagaren

Av EDWARD af SANDEBERG

KOPPARBERG 4 dec. — (ST) Det var på håret att den unge nobelkemisten Glenn Seborgs svenska släktingar i Frövi och Kopparberg på tisdagen fått vänta förgäves på sin berömda anförant. Då tåget rullade in på Köpings station hade han nämligen redan hatt och rock på sig för att hoppa av — han hade på något sätt fått för sig att han skulle byta tåg.

Nå, i sista ögonblicket fick jag ett fast grepp i hans bastanta resulter och därmed var dagen räddad. Tåget gick nämligen direkt till bestämmelseorten och ett "avhopp" hade inneburit flera timmars väntan och kalla fötter för herrskapet Seborg och bitter besvikelse för släktingarna.

Första "släktkänningen" ägde rum redan i Västerås, där 72-åriga sjukgymnasten Arthur Tersmeden, vars mor var syster till Seborgs farfar, bjöd på kaffe och bullar i hemmet vid Skepparbacken. 16-åriga sonen Carl uppträdde dagen till ära med propert vattenkammad kalufs, konfirmationsmundering och en elegant klockkedja, och under de två timmar besöket varade hängde hans ögon med den mest oförställda beundran vid den världsberömda släktingen.

Och så kom naturligtvis albumet med alla de gamla släktporträtten fram och skapade en så genomsvensk atmosfär, att mr Seborg plötsligt började uttrycka sig nästan flytande på ärans och hjältarnas språk. Mrs Helene förstod inte så "väst mycket av vad som sades, men hon tog ingalunda illa upp utan tyckte njuta av att se sin make så i tagen.

Så småningom blev det emellertid dags att bryta upp och nere vid stationen visade makarna Seborg en klädsam blygsamhet genom att ta plats i en rökgig tredjeklasskupé längst bak i tåget i stället för att utnyttja sina reserverade platser i den enda förefintliga andraklassavdelningen.

Sedan misstaget klarats upp gick färden så vidare mot väntande släktingar i Frövi, och under resan dit passade vi på att pumpa makarna Seborg om deras intryck av Sverige. Mr Seborg var ju här för två år sedan, så för honom var det ingenting nytt. Och hans hustru förklarade, att allting motsvarade just det hon sett på de svenska vykort, som med jämna mellanrum brukar droppa ner i hemmet i Berkley.

Skymningen en upplevelse

Något som emellertid tycktes vara en nyhet för dem båda var, att mörkret föll på redan vid 16-tiden. Då månskärnan började framträda allt skarpare som en melonskiva mot den kalkklara himlen sått makarna Seborg som fastkletade vid kupéfönstret och hade svårt att tro sina ögon.

Så småningom började ögonlocken bli allt tyngre på den unge nobelpristagaren och snart sov han gott som ett barn. Mrs Seborg var emellertid piggsom en mörkt och talade bl. a. om vad hon tänkte ta med sig hem åt sina barn som minne från Sverige. Då hon fick höra talas om Stockholms-Tidningens leksaksutställning blev hon genast eld och lågor och lovade besöka den så snart hon kommer tillbaka från sin resa.

I Frövi väntade morbrodern Karl Adolfsson och hans maka Jenny, och från stationen bar det i väg hem till en av Seborgs mera avlägsna släktingar, 72-åriga f. d. lokföraren Carl Norén. Här väntade en hel rad anförvanter och Glenn Seborg studsade märkbart i dörröppningen då han fick se hur många det var fråga om.

Stora famnen på gränges mål

Men så tog han plötsligt ett resolut steg mitt in i församlingen, sträckte ut sina långa armar och omfamnade i ett enda tag Gerda och Lisa och Jenny och Kalle och allt vad de nu hette. Ingen kunde ett ord engelska men vad gjorde det, då deras berömda släkting talade en så utmärkt grängesbergska? Så blev det middag och välkonstskålar i långa banor.

Ett par timmar senare för makarna Seborg tillsammans med herrskapet Adolfsson vidare med tåget till Kopparberg. Där hade halva samhället mött upp nere vid stationen för att se "den berömda", och det tog en god stund för resenärerna att bana sig väg till den väntande taxin f. v. b. till det adolfssonska hemmet.

Onsdagen kommer att ägnas åt vila och eventuellt åt ett besök i Grängesberg, där särskilt stamhemmanet Lisselmågstorp skall tas i skärskådande. Det var här Seborgs morfar och mormor bodde och torpet befinner sig ännu i hr Adolfssons ägo.

På sistnämnda plats togs USA-paret emot av fru Gerda Norén, maka till f. d. lokföraren C. W. G. Norén, som också på långt håll är släkt med nobelpristagaren. Hennes mamma var nämligen gift med professor Seborgs morfar. I det norénska hemmet bullades det fram ett äkta svenskt smörgåsbord — och mr Seborg gillar svensk mat högt och rent — men dessförinnan hann Kurirens medarbetare få en kort pratstund med mannen bakom de senaste årens sensationella upptäcktes inom

(Forts. på sista sidan.)*



Det tersmedenska utseendet går tydligt igen hos nobelpristagaren Glenn Seborg. Han står till höger och studerar familjeporträtten tillsammans med Carl Tersmeden, i mitten, och dennes far, Arthur.



Nobelpristagaren i kemi, professor Glenn Seborg, ses här under uppehållet i Frövi tillsammans med en släkting, fru Gerda Norén.

Nobelpristagare vilar ut hos moster i Kopparberg

Nobelpristagaren i kemi, professor Glenn Seborg kom tillsammans med sin maka på måndagen från Californien till Stockholm, men redan samma dag lämnade paret den svenska huvudstaden för att göra en rundtur till släktingar här i landet. Huvudmålet för färden var Kopparberg, där makarna Seborg skall stanna i två dagar hos moster och morbror, verkstadsarbetare Karl Adolfsson och fru Jenny, men dessförinnan gjordes ett par mellanlandningar, bl. a. i Frövi.



MED ETT GLATT TOMTELENSKA utaf Pär Lagerkvist mot diplom. och ölock ur kungens hand.

PRINCESSAN SIBYLLA och prins Wilhelm ser amerikanen McMillan motta sina Nobelsignier av kungen.

Svensken på podiet lugn och lycklig i strålkastarsken

En Nobelfest blir ju aldrig så strålande som när litteraturpristagaren är någon som deltagarna lärt känna och älska. Dubbelt lysande blir naturligtvis festen då diktaren därtill är en svensk. Inte bara makan och barnen Lagerkvist på parkettens första bänk och de tjugu andra släktingarna i kungliga logen koncentrerade denna till den enda blickar på diktarens vita tankarhuvud.

Alla de närvarande i Kungshuset slöt upp i en jämförelse hyllning till Pär Lagerkvist. Hans majestät-kände tydligen en stark frestelse att dunka sin landman i ryggen när han övrigt check och diplom, men han hade sig och lät det stanna vid en hjärtlig klapp på armen. Och applåderna när Pär Lagerkvist trappans krön. Det var en gång för de kungliga, en gång för folket, var så stormande som de över huvud taget kan bli i det högtidliga sammanhanget.

Anders Österling framhöll i sitt tal att det är ett gammalt värv att ge en svensk Nobelfest och underströk att Pär Lagerkvist inte alls fick pris-tack vare sin nationalitet. Snarare ser tack vare sin nationalitet. Tidigare hade riksmarskalken tilltala om den förste litteraturpristagaren Prudhomme — valet av honom väckte ju livlig anklagning i Frankrike. Utanför pristagarens hemland var man dock inte lika belåten. Men inte behöves Anders Österling vara orolig för att han skall drabbas av en lika stark kritik som den dåvarande akademiskektoret. Att Wärsen: Pär Lagerkvist står sig säkert i 50 år och mera till.

Ramen kring högtiden var traditionell och blandande. I god tid anlände de som skulle sitta på estraden. De ledon, Vetenskapsakademien, Karolinska institutets kollegium samt sex "gamla" Nobelpristagare: Svedberg, Manne Siegbahn, de Heijer, Arne Tiselius, von Euler-Chelpin samt 1939 års pristagare Lawrence, som alltså nu fick se hur



NOBELPRISTAGAREN Pär Lagerkvist.

"kungarikets grand marechal", han är en ättling och ättling till en tidigare titel föga skulle anstå honom.

Bejot inte på utdelarna, bad Wärsen

Det är precis 50 år sedan prisen delades ut för första gången — Musikaliska akademien — och en jubileumsfest var tillisa befogad. De vetenskapliga prisen tillföll Högstförfänta män, därom har väl alla önskingar till transuranerna 95 och varit ense — fortfarande har inga 96. protester höjts mot att Röntgen, van'isveriskättlingen, som kvitterade Hoff och von Behring för ett halv-ett sedan blev de utvalda.

Än sedan däremot litteraturpristagaren Prudhomme ju gav upphov till en del diskussion, af Wärsen som Bergstrand talade om gula febern. Det blev det dittills lättbegripligaste talet. Apor drabbades av gula febern, detta "spöke som växer ut" med de första heger-slavarna från Västafrika och sedan spräds med myggor, sådant kan även lekmanen förstå sig på. Eftersom varken apor eller myggor går att utrota (eller vaccinera) kom Max Theillers upptäckt av vitamin D att spela en enormmänniskligas armod och förhoppning för de berömda människans och andens hjälpslöhet i sin beträffelse.

Sedan Berwalds "Estrella" — uvertyrvarianten 17 D att spela en enormmänniskligas armod och förhoppning för de berömda människans och andens hjälpslöhet i sin beträffelse. Professor Bergstrand trödet i den berömda människans och andens hjälpslöhet i sin beträffelse. Professor Bergstrand trödet i den berömda människans och andens hjälpslöhet i sin beträffelse. Professor Bergstrand trödet i den berömda människans och andens hjälpslöhet i sin beträffelse.

HUMORISTISK HISTORIK AV EKEBERG

Angestens härold fick pris trots sin svenska härkomst

na verkade också harmoniska när de skred ner i kung Gustaf VIII, som tillade några erkännandema ord om vad forskarna betyd för atomkärnorna och deras handhavande. Trumpeterna smattrade och forskarna mottog ett ögonblick folkets hyllning från trappans krön. "Tack så mycket!"

Den lilla flickan Theller blev nu alldeles vit av spänning där hon satt bredvid sin mamma; professor Bergstrand talade om gula febern. Det blev det dittills lättbegripligaste talet. Apor drabbades av gula febern, detta "spöke som växer ut" med de första heger-slavarna från Västafrika och sedan spräds med myggor, sådant kan även lekmanen förstå sig på. Eftersom varken apor eller myggor går att utrota (eller vaccinera) kom Max Theillers upptäckt av vitamin D att spela en enormmänniskligas armod och förhoppning för de berömda människans och andens hjälpslöhet i sin beträffelse.

Pär Lagerkvist har aldrig tidigare trätt fram som Nobelpristagare, han berättat. Nu står han mitt i de två kretsar med insignierna på rykten, så fullkomlig framgång. Även i erempen kan fröjas över att budskapet har nått fram.

Perpetua

Lysande slut på årets längsta dag Folkfest förbryllade Donna från USA



Nobelpristagaren Glenn T. Seaborg på fest i Stadshuset med två Lucia, Donna May Evers från USA (till vänster) och Margit Sjödin.

Årets längsta dag var det för många små Stockholmsbarn på torsdagen, då de var uppe och lussade i arla morgonstunden och sen fick vara ute och titta på Stockholms 25:e Lucias ljusståg på kvällen. Det kinkades och gäspades en hel del bland de små, ex. Åskådarna, som i tillig väntan kantade kortgevägen lite till femdubbla led. Men när Lucia väl kom vinkades det glatt och ivrigt från alla inhyllade knyten på pappornas axlar.

Ingen behövde frysa den här Luciakvällen. Det blåste litet, men var annars idealväder med ett disigt månskén, som förgäves sökte konkurrera med alla de elektriska stjärnorna och ljusen på kortgebierna. Lucia själv, Margit Sjödin, hade svårt att dominera över allt glittrigt, men gjorde sitt bästa med bländande ledenden. Och den amerikanska Lucian, Donna May Evers, såg för ljus, men något förbryllad ut över gamla Stockholm.

Allra roligast här i barnens omvärld var med de små, som stannade av jämte de stora hättarna och stolplångare från Söder till Östermalm. Först kom Hammarby-Skarpnäs körorkester och angav tonen, sen kung Bore omgiven av rödnästa men ungdomliga snögubbar och så Staffan stalleddrag med uppvaktning. Lucia åkte ensam mot en bakgrund av jättestora ljus, efter henne kom tärnorna och därnäst småbarnen, som frejdigt dansade kring sin rullande gran hela vägen.

Nya för året var de vitklädda motorcykelpoliserna, som visade att här kommer Amerika: 17-åriga Donna följde av Onkel Sam, omvärd av stjärnornas och skyskrapors. Sitt stjärnande Mariabarnen, tomtar och julkäppar och orkester från Årsta och Katarina södra folkskolor avslutade låget.

Efter någon förvirring på samlingsplatsen Katarina södra folkskolas gård, där stjärngossar och småtärnor jagade varann, kom man i väg i god ordning kl. 19. Redan på Ringvägen hade Stockholms-Tidningens Lucia fått i sig den rätta vinkningen med både höger och vänster arm, medan Onkel Sam

svängde sin rödvitrandiga höga hatt i vid bage. Amerikans Lucia log blott och möttes med uppmuntrandande tillrop av folket.

Torniebloss på balkongerna och ljus i förgårnen hälsade taget på Söderstråchan. På Västerbron kom det knäppt fram för raderna av skåde-lystna bilägare och deras parkerade fordon, som skulle ha stått på Norr. Målarstrand i stället: därifrån såg man ljusståget avteckna sig vackert mot natthimlen. På Kungsholmen började folk knorra litet smått över förseningen.

— När får dom komma, för jag var uppe kl. 6 i morse och lussade för Årsons, sa en yngling på Fleminggatan och bytte otåligt fot. Språk tyckte han i alla fall att Lucian var ljusig, och hejade nådigt på en bekant bland de mindre betydande tärnorna.

Sitt Eriksgatan, Karlbergsvägen och Odengatan var lika tätt kantade av åskådare. Genomsnittsåldern steg emellertid; småbarnen var nästan försvunna när taget nådde Valhallavägen. Och vid Sitt Eriksmässans område, där kortegen upplöstes en halvtimme senare än beräknat, avskedshyllades de agerande av nästan bara vuxna supporters.

Seaborg fick vänta

Vid den följande Luciafesten i Stadshuset fick publiken vänta en god stund innan Lucia inträdde, följt av sina nio tärnor. Hon kröntes av Nobelpristagaren Glenn Seaborg, som hängde Luciasmycket om hennes hals och lyckönskade henne på svenska. Dessförinnan hade statsrådet Danielson delat ut Stockholms-Tidningens guldbell och rekordpokaler. Efteråt blev det dans i Blå hallen.



GLENN SEABORG omgärdad av studenter på Nobelfestligheternas Stadshörsbalken på måndagskvällen.

Ett enstaka engelskt ord i Seaborgs tal på svenska

Nu 30 år senare har man funnit den igen, och där hade Pär Lagerkvist något väsentligt för sin diktning, evighetsperspektivet kring människorna, och det blev hans Nobel-tal.

Pär Lagerkvist är en tillbakadragen man, och ett offentligt tal ur hans mun är en liten sensation. Han hade dock tryggheten att veta släkt och vänner vara tillfinnandes i salen. Från fru Elaine, som satt vid kungens västra sida och hade prins Wilhelm till kavaljer, till barnen, bästa vännen, konstvären Henrik Sörensen, som rest hit från Oslo, sykon och syskonbarn, ja till den blödde unge vikingen Claes Lagerkvist, som förde lilla miss Theiler till bordet och chevalerskt konverserade Nobelpristagardottern och försåg henne med en så stor portion glass som hon någonsin kunde önska sig.

Det var professor Einar Löfström som, harangerade pristagarna, och han anropade de gamla nordiska gudarna om hjälp med en liknelse, och han fick en mycket vacker sådan att sluta talet med. Han erinrade om Heimdal, gudarnas väktare vid regnbågen. Forskare och skaldar skall så som Heimdal vakta den skimrande regnbåge, som poesi, forskning och tanke spännet mot framtidens himmel.

Mild och trygg

Pär Lagerkvist, som suttit i strålende humor med glasögonen uppskjutna i pannan och talat med norske ambassadörens maka, började tacktalen. Ur fickan kom en bunt papper, den återfunna novellen. Han började med varmt tack för sitt pris och försäkrade skämtsamt att han för all del inte deltagit i akademibeslutet och kände sig oansvarig och glad inför detta. Något tal hade han nog inte tänkt att det skulle bli, han hade funnit just det han ville säga i "den bestående berättelsen från 1922 "Myten om människorna" till.

Agg

Så följde den långa vandringen till talarstolen för alla i tur och ordning. Nobelpriset är universellt, och lika sympati borde fördelas mellan alla de utvalda, men det kan inte hjälpas att Glenn Seaborg fick särskilt varma applåder när han på brutet bergslagsmål förklarade att han ville säga några ord på sin moders språk. Han framhöll hur glada och ärade han och hans medhjälpare kände sig, och han hoppades "att de grundännen vi funnit blir till good för världen".

Nere i Blå hallen hade studenterna samlats i stora skaror, och den sedvanliga uppvakningen för pristagarna ägde rum med studentsång, fanborg och ett fint tal på engelska av fil. lic. Bo Adler, professor Seaborg talade för samtliga pristagare, först på svenska och därefter på engelska och önskade ungdomen lycka till.

Yngsta deltagaren i särklass på banketten var Nobelpristagardottern miss Theiler med sina ca 12 år, hennes ögon lyste av stolthet när "pappa" talade.



KANDELABRARNÄ GLITTRAR i bordsvagnerna med prins Bertil konverserar sin bordsdam, medicinpristagaren Max Theilers maka.

12/14/53
Radio show to honor U.C. Nobel scientists

Two University Nobel prize-winning scientists will be honored by the University Explorer during the

regular broadcast of that program at 1015 a.m. Sunday on KCBS.

The title of the show will be "Beyond Uranium," and it tells of the research in transuranium elements—"heavier-than-uranium" elements.

This is the field in which Edwin M. McMillan, professor of physics,

and Glenn T. Seaborg, professor of chemistry worked. They are both members of the University Radiation laboratory faculty.

There are now six of the "heavier-than-uranium" elements—all discovered since 1940. The best known is plutonium, nuclear fuel for the atomic bomb.

Wednesday, December 19, 1951

Shot in arm issue
Cal Monthly tells of U.C. glory; Nobel prizes, campus growth

By AL MANZANO *DAILY CAL.*

The alumni shot in arm. The California Monthly, is December's best bet for a button-bursting pride-in-the-University edition.

Stories on the recent Nobel prize sharing of Berkeley professors Edwin M. McMillan and Glenn T. Seaborg and on the Alice-like growth of the far-flung campuses are almost too much for even the most rah-rah. "Your University—1951" is particularly overwhelming and filled with all kinds of statistics, well presented and organized, which further prove why anyone would be a fool to go to Stanford.

Additional articles of informational value although adding to the general aura of greatness, are less dedicated in material.

Jeanne Hamilton, former Monarch city editor, writes an entertaining odyssey based on the International board sponsored Eur-Cal tour. It is a composite of "Innocents Abroad," Stanton Delaplane and good Daily Californian.

Great for the armchair geologist is Professor Donald Savage's account of fossil hunting and Bay area geological history. "Keys to the Past in Our Own Back Yard" is a good exposition of scientific fact to the lay reader, clear and interesting.

A serious note is injected in Joseph Fabry's "Sacred Cows On the Road to Survival." It deals with "economic and social barriers to against sound conservation."

It is a California's post-script to the conservation issues recently debated in the world's press. However, it is practical in nature and applicable in practice.

The question as to whether or not the Bear cagers are going anywhere this casaba year gets a pre-season and optimistic answer from Bob Rubin in "They're Heading Up From the Cellar." The article ends with the question "Wanna bet?" We think maybe yes we do.

The California Monthly spruce-up and pick-up from former years is demonstrated in the pictorial series on campus doings.

"The Hub of the Campus" is a picture story on the library. The quality of the pictures reflects the over-all excellence of the issue's art work.

The regular alumni columns on who is doing what are naturally restricted in interest. The news briefs are also slanted toward the alumni readership.

Regardless of these, the monthly is of general interest to all Californians. University spirits can get their nourishment here.

Glenn T. Seaborg '34 Wins Nobel Chemistry Prize



DR. GLENN T. SEABORG '34

UCLA gained its second alumnus Nobel Prize winner on November 15 with the announcement from Stockholm that Dr. Glenn T. Seaborg '34 had been awarded the Nobel Prize in Chemistry jointly with Dr. Edward M. McMillan. Both scientists are on the Berkeley faculty of the University of California. They will share an award of approximately \$32,357. First UCLA Nobel Prize winner was Dr. Ralph Bunche '27, who was honored two years ago for his peace-making efforts in the Middle East.

Drs. Seaborg and McMillan were given the 1951 chemistry prize for discovering plutonium,

a substance that made it easier and cheaper to produce the A-bomb.

Born in Ishpeming, Michigan, Seaborg at the age of 10 came to California with his parents and settled in South Gate. One of his early accomplishments was winning the marbles championship of that city. In high school he determined upon a career in chemistry and was class valedictorian when he was graduated from David Starr Jordan High School.

He earned money to attend UCLA in a variety of ways: as a stevedore, night watchman, apricot picker and linotype mechanic apprentice. In his junior year he obtained a job in the chemistry department at UCLA—preparing samples, doing simple research and even doing some teaching. He was graduated in 1934 with a Phi Beta Kappa key.

He then went to Berkeley to get his Ph.D. degree under the late Dr. Gilbert N. Lewis and published several papers jointly with him. He also joined the staff of the radiation laboratory at Berkeley and soon found himself involved in the exciting new science of nuclear chemistry.

Savants Bare New Nuclear Discovery

OAKLAND TRIBUNE

12/28/50

BERKELEY, Dec. 28.—A new nuclear theory which will enable atomic researchers to predict the radioactive properties and behavior of certain advanced isotopes as they are developed was reported today by two outstanding University of California scientists.

(Isotopes are chemicals or substances that possess identical characteristics and are distinguishable only by radioactive transformation or differences in atomic weight.)

Dr. Glenn T. Seaborg, recent winner of the Nobel Prize in chemistry, and Dr. Isadore Perlman, chemistry professor in the University of California Radiation Laboratory, told their scientific colleagues of the American Physical Society, meeting for three days on the Berkeley campus, of recent work which may provide a key to new isotopes—the building blocks of nuclear science—of the heavier elements on the atomic scale.

RATE OF FISSION

The atomic scientists said that an empirical correlation of the known data indicates that the rate of spontaneous fission seems to depend on an "even-even" nuclide—an even number of neutrons and even number of

protons though not necessarily an equal number of each,

About 12 elements such as uranium, thorium and plutonium were used in the correlation, they explained. Only the heavier elements were used because anything lower on the atomic scale than thorium has a fission rate too slow to measure while those above, at least those with the even-even nuclide, enable the scientist to predict the rate of fission.

One of the deterrents to atomic research, they emphasized, has been the short "half-life," or time for half the atoms of a radioactive element to disintegrate, with the danger of high radioactivity. However, the scientists say that with the new findings they can already predict other plutonium isotopes which will be more stable and safer to handle.

CITE RESEARCH

As an example of such isotopic development, they cited the work of Stanley G. Thompson and Albert Ghiorso, also U.C. Radiation Laboratory researchers, in isolating Plutonium 242.

The new isotopes probably won't be of much significance to the man on the street but Seaborg and Perlman emphasized their importance to the scientist. "Being longer lived and safer to handle, they will probably be the laboratory isotopes of the future," they predicted, "and may even eventually provide the key to the discovery of new elements."

Dr. Seaborg also reported discovery of a new radium isotope, Radium 230, the heaviest yet developed.

By bombarding these substances in an atom-smashing device, the scientists hope to build up their nuclei until they reach the size of element 99 or 100.

In many respects, this process is much like trying to build a 99-story apartment house by hurling

rooms at a 98-story building and hoping the added rooms will stick. And just about as costly.

If elements 99 and 100 are created, will they have any immediate practical value?

So far as the UC workers can see, they will be practically worthless.

Nevertheless, the scientists expect to spend many months or years to achieve the goal. That achievement, they feel, will more than pay off in added knowledge of the nature of matter and energy.

How Lightning Works —The Scientists' View

An explanation for terrific lightning storms was presented yesterday to the American Physical So-

ciety at its meeting at the University of California.

The voltages are formed by the freezing of slightly contaminated water into hail pellets in the center of thunder clouds.

Laboratory studies supporting this view were presented by Dr. Marvin Backman of the U. S. Naval Ordnance Test Station at Inyokern.

New Form of Radium Created at UC Lab

A new form of radium—radium-230—has been created in the University of California's atom-smashing cyclotron.

Its discovery was reported yesterday to the American Physical Society meeting in Berkeley by Drs. William A. Jenkins and Glenn T. Seaborg.

Wanted: Elements

S.F. CHRONICLE 12/29/51

UC Scientists Hunting 99 and 100

—Of No Use, Just for Knowledge

By MILTON SILVERMAN
Science Writer, The Chronicle

A pair of University of California scientists yesterday sketched a detailed road map leading to one of the great discoveries of the future

The goal is the creation of element 99 and element 100.

Neither chemical has been seen by human eyes. If either ever existed in this section of the universe, it was hundreds of millions of years ago when the solar system was in the process of creation.

Plans to make them in a powerful atom-smashing cyclotron were indicated at Berkeley before the American Physical Society by Drs. Isadore Perlman and Glenn Seaborg.

Dr. Seaborg, who last month was awarded a Nobel prize for his work in creating other man-made elements, spoke at a session led by Dr. C. C. Lauritsen of the California Institute of Technology and president of the American Physical Society.

According to Drs. Perlman and Seaborg, the attempt to create elements 99 and 100—a kind of "race to the north pole" for scientists—will probably start from three different materials.

One of these is known as plutonium 242, a form of element 94.

The second is americium 243, a form of element 95.

The third is curium 244, a form of element 96.

It was a hectic year for some prominent San Francisco attorneys. George Davis began the year with an acquittal on conspiracy charges. But four colleagues, Vincent Hallinan, James Martin MacInnis, William E. Ferriter and James C. Purcell, sweated until November before winning acquittal on similar charges in connection with the tax evasion case of narcotics dealer Paul J. Steffen.

It was the year, too, that San Francisco's Joe DiMaggio decided to trade his outfielder's mitt for an announcer's mike with the New York Yankees. And the year Lefty O'Doul lost his "life job" as manager of the San Francisco Seals and landed a similar job in San Diego. And the year Pierre Monteux announced he would trade his "life job" as conductor of the San Francisco Symphony for a life of retirement. Another "lifer," Warden Clinton Duffy of San Quentin, announced he would step up to a spot on California's parole-ruling Adult Authority.

THE YEAR produced a trio of presidential candidates from the West Coast. Grocer Fred Proehl of Seattle and Singing Cowboy Stuart Hamblen of Arcadia, Calif., were already nominated by their respective parties—the Greenback and the Prohibition parties.

But Republican Earl Warren was the front-running dark horse on the Coast. He started 1951 as an unprecedented third-term Governor of California and ended it by announcing his candidacy for his party's nomination for President next June.

The West's most sensational romance started in a Torrance, Calif., malt shop when Swiss millionaire Rolland de Vigier, 28, spotted 16-year-old Martha Morris. Two months later they were married at Quartzsite, Ariz., and again at Notre Dame Cathedral in Paris. Martha was promptly dubbed the Cinderella bride, but the marriage ended on the rocks within a few weeks when Martha decided she and her husband were worlds apart.

As sensational was the death and rebirth of Mrs. Theresa Butler of San Francisco. Found an apparent suicide and lifeless in her apartment bathtub, she was taken to the Morgue. At the Morgue the "corpse" stirred. At Harbor Emergency Hospital it came to life. Two weeks later Mrs. Butler happily vowed never to commit suicide again.

New, Heavier Plutonium Manufactured at U.C.

S.F. EXAMINER By HENRY PALM 12/29/51

Atomic scientists of the University of California at Berkeley announced yesterday they have "designed and constructed" three new kinds of transuranic elements.

Most important of the new manufactures is plutonium 242, a heavier twin of plutonium 239, the stuff of the Nagasaki atom bomb.

The other two are americium 242 and curium 244, also heavier versions of elements discovered earlier.

All three of the new atoms, called isotopes by the scientists, are variants of transuranic elements first discovered in the University of California Radiation Laboratory.

MADE TO ORDER—

Dr. Glenn T. Seaborg, Nobel laureate in nuclear chemistry, and Dr. Isadore Perlman, professor of chemistry, made the new announcements to the American Physical Society, now meeting at Berkeley.

In relating the work they emphasized that these were manufactured products, deliberately pre-designed and turned out in the cyclotron.

In an earlier time such things were announced as "discoveries," often made by chance.

Explaining the difference, Perlman said:

"We have reached the point where we are beginning to feel at home among the nuclei of transuranic elements. If we start out now to make something, we have a pretty good idea what the result will be."

In the case of plutonium 242, hailed as a particularly important tool for future research, the scientists designed it in the same manner that an automobile maker designs a new model, because they wanted an atom with certain characteristics.

They were able to predict successfully that plutonium 242

would be comparatively stable.

They found that its half life (the time in which it exhausts one half of its radioactivity) is 500,000 years, compared to 24,000 years for plutonium 239.

Thus the new isotope will not have the extreme radioactivity which makes virtually all of the transuranic elements hard to handle.

Seaborg said plutonium 242 has no foreseeable military application. Its value lies in the fact that it gives the scientists a new "building block" in their efforts to construct new artificial elements above californium, No. 98 in the periodic table.

VAST CREATION—

Until UC scientists began shaking up the physical world some fifteen years ago under the leadership of Dr. Ernest O. Lawrence, there were only ninety-two known elements, with uranium the heaviest.

Thus far the UC men have added six—neptunium, plutonium, americium, curium, berkelium and californium.

Add to the basic ninety-eight, all of their chemical twins or isotopes and the total now approaches 500.

Seaborg predicted that, in the light of new understanding, the total may some day approach 2,000.

Actual production of plutonium 242 by bombardment in the cyclotron was credited to two research chemists, Stanley G. Thompson and Albert Ghiorso.

Marvin E. Backman, a scientist at the Navy's testing base at Inyokern, reported at yesterday's meeting that sub-freezing temperatures and impurities in water are what produce thunderstorms.

Doctor Backman said water placed in a trough, with ammonium chloride added as an impurity, gave off an electrical charge as freezing occurred.

SHELTERED IN RAVINE

The cyclotron is housed in a 40-foot diameter room built into a natural ravine for shielding by the earth.

Fifty other papers, most of a highly technical nature, will be read today by scientists attending the meeting.

An estimated 250 physicists were attending the scientific sessions, largely devoted to developments in nuclear physics.

Scientists now are in position to produce hundreds of new kinds of atoms and to be able to tell in advance how each one will behave, two University of California researchers reported.

SUPERHEAVY ATOMS

A few new superheavy atoms, not found in nature, are in the offing. In addition, hundreds of

variations of atoms already known, can be made by cyclotrons and atomic reactors.

Some of the new heavyweights will split themselves spontaneously like plutonium and uranium 235 but will not be useful as atom bomb fuel. These heavyweights and the hundreds of other variants will be made to give scientists better working materials in research, better medicines and new kinds of "hot atoms" for industry and agriculture.

This prospect was put before the society by Dr. Glenn T. Seaborg, Nobel prize winner, and Dr. Isadore Perlman, both specialists in the chemical phases of atom smashing.

Physics Unit to Hear Cyclotron Described

SF CALL-BULLETIN 12/29/58

Successful operation of the University of Washington's new 60-inch cyclotron was to be described at today's final three-day session of the American Physical Society at the University of California.

The Washington instrument, scientists from Seattle said, is patterned after the Berkeley 60-inch cyclotron, with several new features.

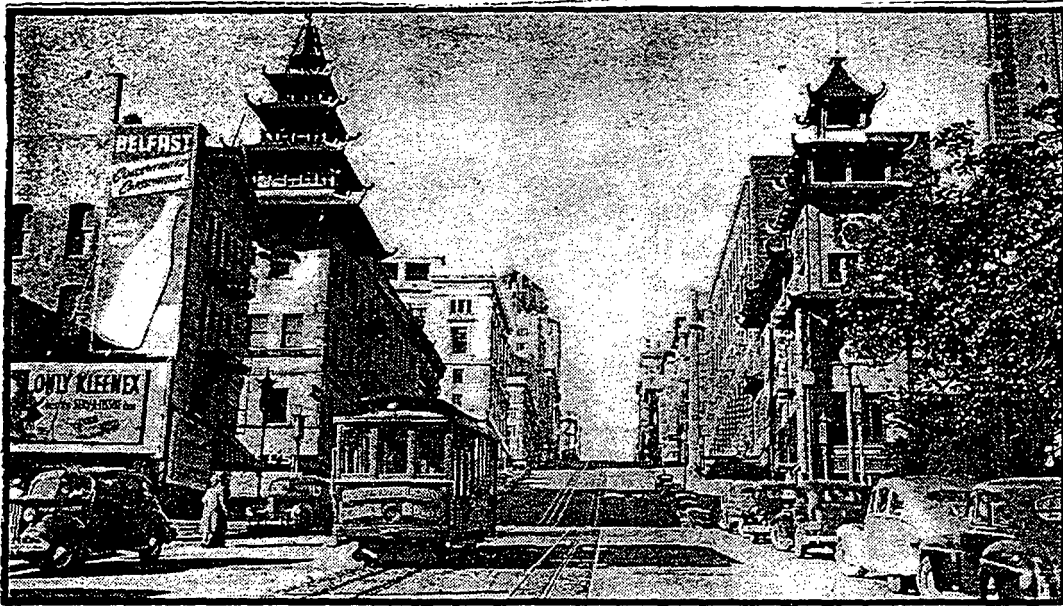
No insulated water supply is required and the cyclotron is so stable it will "ride-through" almost continuous sparking.

FISSION FORMULA

Dr. Seaborg reported a formula which will predict the rate at which these yet-to-be made heavyweight atoms will undergo fission; the process by which they split themselves spontaneously.

Up to now, six superheavyweights have been produced. They are Neptunium, Plutonium, Americium, Curium, Californium and Berkelium. Dr. Seaborg is a co-discoverer of all but one of these. The formula for describing those yet to be made has been checked on these existing heavyweights.

12/30/51



Chronicle

KNOTS IN THE CABLE couldn't have snagged California street's little red cars more effectively than the legal snarl which surrounded the city's purchase of the bankrupt line last fall. Weeks of wrangling finally determined the price—\$138,000. Then as 28,000 riders anticipated resumption of a service deprived them since August, a sudden fusillade of lawsuits threatened to kill their hopes. But as the State Supreme Court turned them aside, it appeared the cars would soon be plying their clanging trade.

West Coast

THE YEAR 1951 for the West Coast fell into at least one familiar pattern: The West continued to grow as waves of emigrant Easterners continued to roll over the Sierra.

Census statistics placed California first in population gained over the past decade. Its official April, 1950, population of 10,586,223 had been swelling at an estimated rate of 25,000 persons a month. At the end of 1951, some 11,000,000 people carried the label "Californian," and for the first time in the State's history, most of those people wore skirts. For every 1000 women, there were only 976 men. But the average female had little to complain about. Her man was making more money than ever before.

The Commerce Department called the West the land of opportunity. California, Washington, Oregon and Nevada, it said, were offering better jobs at better pay than any other area. Average per capita income in the four states had topped the national scale in 1941 and was still topping it in 1951.

California alone had 957 new industries in the first ten months of the year, with a total new capital investment of \$397,867,945—an increase of 135 per cent over the same period in 1950. And for a change, the pain of growing began to find some relief.

It was the year California's water problem was partly solved by the opening of the huge pumping station at Tracy, literally the heart of the Central Valley Project. It was through this plant that Sacramento river water entered the Delta-Mendota canal for a 117-mile trip through the arid San Joaquin valley to the Mendota pool west of Fresno, only to start north again down the summer dry bed of the San Joaquin river for irrigation.

It was the year that long droughts threatened to cut power output in the traditionally damp Northwest. And a threat by Defense Mobilizer Charles Wilson to transplant the power-hungry aluminum industries of Washington State brought howls of anger from Northwest Congressmen. The

problem was solved by Interior Department rainmakers, who seeded clouds with silver iodide and brought drenching rains.

Silver iodide worked too well in Southern California. Scientists Joseph Vowel and Joseph Vittini, perched atop Figueroa mountain, near Santa Barbara, seeded clouds with the chemical and were hit by a snowstorm that marooned them for two days.

WHILE other areas tried to make rain, the Bay Area wanted to stop it. Last winter's storms brought snow to San Francisco and floods to Marin county

and the new winter got off to a wet start. Rain caused the \$25,000 house of British Vice Consul Walter Hollis Adams to slide in a crumpled heap to the bottom of a San Francisco hill. Rain and high winds closed the Golden Gate bridge for the first time in its 14-year history.

Water, however, was not the only liquid that concerned Californians. For every man, woman and child in the State, 297 bottles of beer, 425 jiggers of hard liquor and 170 glasses of wine went down the hatch.

Once again the swallows came back to Capistrano. And San Francisco's pigeons came back to San Francisco to score a rousing victory over Mayor Elmer Robin-

son, who gave up trying to snood them off the Civic Center. The Mayor himself came off with something less than a rousing victory by squeaking in over Supervisor George Christopher in the November Mayoralty election.

"I Love You California" was adopted as the official State song but the "Prisoner's Song" better fitted some notorious Californians caught cheating on their income taxes.

Gambler Mickey Cohen and Pinball King Louis Wolcher both went to jail for tax evasion. And Gambler Elmer (Bones) Remmer was trying to beat the same rap as the year ended. Abortionists Inez Burns and Gertrude Jenkins completed terms for abortion and started new terms for tax evasion. But the law touched other people more lightly.

Chester Burke used a BB gun to rob an Alameda bar of \$700, but got off with a conviction for second degree robbery when a Superior Judge practiced with the gun in the basement of the County Courthouse and decided it was not a lethal weapon.

IT WAS two years after the Year of the Oath, but it wasn't until mid-November that the University of California Regents voted, 12 to 5, to withdraw their controversial demand that all university employees sign a non-Communist declaration. And a decision on the constitutionality of such requirements was still pending in the State Supreme Court at year's end.

Strife between faculty and Regents, however, did not keep the university from winning international honors. Chemists Glenn T. Seaborg and Edwin Mattison McMillan shared the 1951 Nobel Prize for chemistry and the \$32,357 award. And two students, Albert Arnold and Jim Trew, set a new world teeter-totter record of 72 hours. Their record was topped in a week by two College of Pacific students, who went up and down 57,101 times over a period of 100 hours.

Californians watched in person and on television sets when General Douglas MacArthur paraded his way through San Francisco on his way home from Tokyo. They watched again when 52 nations of the world gathered in San Francisco's Opera House to conclude a treaty with Japan.

But Sacramento males peeped in vain when a blonde named Jerry Coburn promised to ride nude as Lady Godiva to protest high taxes during a parade. She welshed by wearing flesh-colored tights and an over-size blonde wig.



Seaborg, McMillan Share Nobel Award



EDWIN M. McMILLAN, (upper left), co-discoverer of plutonium and neptunium and responsible for the theory of phase stability, and GLENN T. SEABORG, (left), nuclear chemist responsible for the discovery of several new elements and isotope, U-233, will share the Nobel Chemistry prize for 1951.

IT HAS become almost a California tradition for University faculty members to take a large share of the world's highest honors for outstanding research.

Before 1951, the University claimed four Nobel scientists: Wendell M. Stanley, professor of biochemistry and director of the virus laboratory; Ernest O. Lawrence, professor of physics and director of the radiation laboratory; William F. Giaugue, professor of chemistry, and John H. Northrop, professor of bacteriology.

Last month, two more Californians were added to this distinguished group. They were physicist Edwin M. McMillan and chemist Glenn T. Seaborg, both pioneers in atomic research and discoverers of several new elements. McMillan and Seaborg share the \$32,357 Nobel prize in chemistry for 1951.

McMillan, 44, was co-discoverer of both neptunium and plutonium, and is responsible for the important theory of phase stability which has shown physicists how they can extend the energy range of high energy "atom smashers" far beyond that of machines developed in the 1930's.

The new bevatron under construc-

tion at Berkeley is built with McMillan's theory as a basis and is designed to accelerate protons to 6.4 billion electron volts—more than 60 times the highest energy that could be hoped for with the cyclotron design of the 30's.

A native of California, McMillan's interest in physics and chemistry took deep roots in his early life. As a youngster living near the California Institute of Technology in Pasadena, he frequently attended weekly lectures on the most technical of subjects.

He later attended the California Institute of Technology as a student, receiving his B. S. degree in physics in 1928 and his masters in 1929.

McMillan came to the University three years later as a national research fellow and rose through the ranks to full professor of physics in 1946. He has been a member of the radiation laboratory staff since 1934.

Earlier this year, McMillan was presented the 1951 Research Corporation Scientific award "in recognition of the vital parts he played in the greatest achievements in physics of the decade 1940-1950."

Seaborg, 39, discovered plutonium

while working with associates at the University in 1940. It was the first synthetic element ever to be seen and later was to become a source of atomic energy. The noted scientist and his group were also responsible for discovery of another atomic energy isotope, U-233.

The young chemist was on leave of absence from the University from 1942 until 1946 as the chief of the section working on trans-uranium elements at the Chicago Metallurgical laboratory. While there, he and his associates discovered two more trans-uranium elements, americium and curium. He was still on leave when the University promoted him from assistant professor to full professor in 1945. On his return to the campus, Seaborg and his colleagues discovered element 97, Berkelium, and element 98, Californium. Both were created with the 60 inch cyclotron.

Born in Ishpeming, Michigan, Seaborg worked his way through UCLA to receive his bachelor degree in 1934. He then transferred to the Berkeley campus, where he won his Ph.D. in 1937. For two years, Seaborg was laboratory assistant to the late Gilbert Newton Lewis, then dean of the college of chemistry on the Berkeley campus.

GLENN T. SEABORG OF CALIFORNIA, NOBEL AWARD WINNER, DESCRIBES CEREMONY IN STOCKHOLM

Since my ancestry is completely Swedish, I have always been very interested in the Scandinavian countries. One of the greatest thrills of my life was the moment I first set foot on Swedish soil, and then came the exciting experience of becoming acquainted with relatives I had never seen before and visiting the home where my mother spent her childhood.

My second visit to Sweden was at the time of the Nobel award ceremonies in 1951. These ceremonies and all the events attendant are an unforgettable experience. When invited to be Member-of-the-Month, it immediately occurred to me that here was an opportunity to share this experience; perhaps some of the readers of SCAN who have not had the opportunity to witness this event would be interested in some of the details that are not so frequently emphasized.

One of the first things that strikes Americans as they enter the Konserthuset on December 10 is the formality of dress, much beyond anything to which we are accustomed — even the photographers are clad in white tie and tails. The Royal Academy is seated in tiers up on the stage, which is flower decked. Centered at the rear of the stage, is a decorative door, and directly over this is an imposing bust of Alfred Nobel surrounded by flowers.

The audience is prompt as the royal party most certainly will be prompt, and the audience must be in their places when the royal party enters. Their entrance is followed by that of the prize winners, this being the one occasion that the king is not the last to enter a room. This he does in special deference to the award winners, and he also actually hands the Nobel awards to the recipients, speaking to each one and shaking his

MEMBER-OF-THE-MONTH



Prof. Glenn T. Seaborg

hand.

One of the most pleasant memories of the ceremonies is the beautiful organ music.

The dinner following the Nobel ceremonies is held in the Stadshuset in the Gold Hall. This is a beautiful room done in gold as the name implies, and round the room are scenes depicting the whole of Sweden's history. Following the dinner there is dancing in the Blue Hall, which is not blue. This hall, with its tremendously high ceiling and marble balcony and stairway leading from the Gold Hall, was intended to be finished in blue tile. When the brickwork was completed, however, it was so beautiful and impressive that the hall was considered finished, but the name "Blue Hall" still persists.

It is my hope to return to Sweden before too many years for a more extended visit and to then become intimately acquainted with the whole of Scandinavia.

Kvällen efter Luciadagen gick strömmen mot det av Stockholmspubliken omtyckta Konserthuset vid Hötorget — det gällde Arméns Luciahögtid till förmån för den sociala landsinsamlingen.

Det har blivit tradition att den folkvalda Lucian i Stockholm kommer och gläder de alltid tacksamma deltagarna i festen, och i hennes sällskap brukar även Amerikas Lucia befinna sig. Sa var fallet i år och därtill ljusdrottningen från vårt östra grannland.

Höjdpunkten blev nog ändå, för att tala med en Stockholmsstidning, Nobelpristagaren professor Glenn Seaborgs tal på perfekt svenska, som hon gav i början av sammankomsten, sedan överstelöjtnant L. Stenberg introducerat honom:

— Som ni vet var båda mina föräldrar från Sverige, sade han. Min mor är född i Grängesberg. Hon reste till Amerika när hon var sju-ton år. Min fars föräldrar var båda födda i Sverige. Farfar var född i Västmanland och farmor i Örebro län. Min farfars far var verkmästare på Hällefors bruk, dit familjen flyttade när farfar var bara ett år. Farfar flyttade till Amerika när han var ungefär tjugutvå år. Det var under inbördeskriget i Amerika.

Jag är glad att jag har fått komma hit i kväll. Jag känner mycket väl Frälsningsarmén från mitt hemland Amerika. Min mors bästa vän var ett med en kapten i Frälsningsarmén, som var svensk. Jag mötte dem ofta, när jag var barn, och jag såg hur de helt gav sitt liv åt arbetet i Armén, som gör ett mycket stort och viktigt arbete i Amerika. Jag vet att Frälsningsarmén också i Sverige spelar en stor roll. Den är en sant internationell rörelse. Den känner inga gränser, utan arbetar över hela världen.

Vetenskapen går fort framåt i våra dagar. Man kan tycka att människans blivit efter. Stora upptäckter har gjorts, men folken har ännu inte kunnat använda alla upptäckterna för att skapa en bättre värld. Frälsningsarmén arbetar inte bara för att hjälpa människor i nöd. Den vill också visa folken vägen till en bättre värld.

I går fick jag se den svenska Luciefesten. Lucia är symbolen för hoppet om ljus i mörkret. På samma sätt visar Frälsningsarmén vägen

STRÅLANDE LJUSFEST

INFÖR FULLSATT KONSERTHUS

Tre länders Lucior och Nobelpristagaren Glenn Seaborg ger glans åt möte i barmhärtighetens tjänst

mot ljuset i mörkret här i världen.

Hans tal avtäckades med en kraftig applåd, och så satte man sig till rätta för att avnjuta Radiotjänsts symfoniorkesters inslag i programmet, vilket också radierades. Dirigent var professor Tor Mann och solist konsertmästare Tage Broström. Orkestern ackompanjerade även operasångerskan Eva Prytz, vars härliga sopran fyllde den stora salen med sitt väljud. Övriga medverkande var sångaren Gustaf Kolm, pianisten Gunnar Blomberg och Templets hornmusikkår.

Allt ljus släcktes och blickarna sökte sig mot den aning av ljus som

vilde tränga igenom dörrspringan vid podiets fönndörr. Nu kommer de! Först Sveriges ljusdrottning Margit Sjödin, Amerikas Donna Evers och Finlands Maj Ekman. I deras sällskap var nio tärnor, som bildade en ramp av strålände ljus. Solstråle Gunnel Nygren, Söderfälje, stod redo att hälsa sina stora »systers», och det gjorde hon med den äran, Gustaf Kolm sjöng och så frambar Luciorna från Amerika och Finland hälsningar:

— 800 svenska mil har jag kommit för att få vara med om ljusfesten i Stockholm, sade den först-

nämnda, och ni kan inte tro vilken väg av hemlängtan som går fram bland svenskarna i Amerika när julen stundar. De kan inte alla komma hit, men önskar er en god jul!

Finlands Lucia, som under kriget tillbringade någon tid i Sverige, hade också en vänlig hälsning från våra vänner på andra sidan Bottenhavet. När hon trätt tillbaka till sin plats, tog kommandör T. I. Ogrim till orda och citerade bibelordet: »Ditt ord är mina fötters lykta...» samt anknöt därtill några tänkvärda ord om Bibelns betydelse som ljus-spridare och vägledare för människor, som vill vandra i dess ljus. Vacker var ceremonin, när han till vardera av Luciorna lämnade en bibel, som ett minne från högtiden. Överste G. Nilson avslutade med bön, och från alla håll hörde man ord av uppskattning om den alltigenom goda och ljusa högtidskvällen.



Finlands, Amerikas och Sveriges Lucior, professor Seaborg och operasångerskan Eva Prytz (tänkerade av överstelöjtnant Stenberg, kommandör Ogrim och överste Nilson)

Dagens Dikt

DET ÄR VACKRAST NÄR
DET SKYMMER

Det är vackrast när det skymmer,
Allt som kär och älskar sig
Inom somnad i ett dunkelt ljus
I ett rum,
Och en stjärna i himlen.

Allt är ömhet, allt är smula av händer
Herren sjätte utplanar gatan stränder
Allt är nära, allt är långt från
Allt är givet
Människan som lan,
Allt är mitt, och allt skall tas
från mig.

inom kort skall allting tas från mig.
Träden, molnen, marken där jag går.
Jag skall vandra —
ensam, utan spår.

Pär Lagerkvist

H. T. Seaborg, Father of Nobel Winner, Dies in S. G.

The father of Prof. Glenn Seaborg of Lafayette, former Nobel Prize winner and a noted atomic scientist, died Wednesday in a local hospital.

Funeral services for H. Theodore Seaborg, 76, of 9237 San Antonio, South Gate, will be held tomorrow at 2 p.m. from the Chapel of Biby and Belvea Mortuary, with Dr. Herman Spruit officiating. Burial will be in Inglewood Cemetery.

Born in Michigan, the father came to California and the South Gate area 35 years ago. A machinist, he was a member of the Mayflower Lodge of the Swedish Vasa Order.

Other survivors include the widow, Selma; a daughter, Jeanette of South Gate; two held tomorrow at 2 p.m. from the Chapel of Biby and Belvea Mortuary, with Dr. Herman Spruit officiating. Burial will be in Inglewood Cemetery.

50TH ANNIVERSARY HALL OF FAME



Ernest O. Lawrence

For his invention of the cyclotron and other vital machines for nuclear physics; for important research into the nature of the atomic nucleus. Director of Radiation Laboratory, University of Calif.



Robert E. Peary

For the discovery of the North Pole in 1909 after years of Arctic exploration; for his courage in proceeding on foot with a small group when most of his party had turned back. Peary died in 1920



Charles A. Lindbergh

For planning and executing the first solo flight across the Atlantic Ocean on May 20-21, 1927, in The Spirit of St. Louis; he flew 3600 miles in 33½ hours; for his inspiration to aviation development



I. I. Rabi

For discoveries in physics pertaining to magnetism in regard to molecules resulting in much new information in the atomic and molecular structures; also for radar research. Faculty, Columbia Univ.



Thomas Midgley, Jr.

For his discovery of the antiknock properties of tetraethyl lead, principal ingredient of the ethyl and the high-test aviation gasolines and vital to powerful modern engines. He died in 1944



John L. Savage

For outstanding work in civil engineering; for directing design and the building of Grand Coulee, Hoover and other dams and irrigation projects throughout the world. The Bureau of Reclamation



Robert A. Millikan

For his work in physics, including determination of fundamental electrical charge on the electron; for his research on the properties of cosmic rays. Prof. emeritus and v.p., California Institute Tech.



Glenn T. Seaborg

For discoveries and continuing research in nuclear physics pertaining to the elements heavier than uranium; codiscoverer of plutonium and others. Member of faculty, University of California



J. Robert Oppenheimer

For extensive research in nuclear physics; for his direction of the Los Alamos laboratory in New Mexico during the perfection of the atomic bomb; for work on Atomic Energy Comm. Princeton, N.J.



Alexander P. deSeversky

For the invention of the fully automatic bomb-sight, for airplane design, including a single-seat fighter plane, air-cooled engine with a turbo-supercharger for high altitude flight. New York City



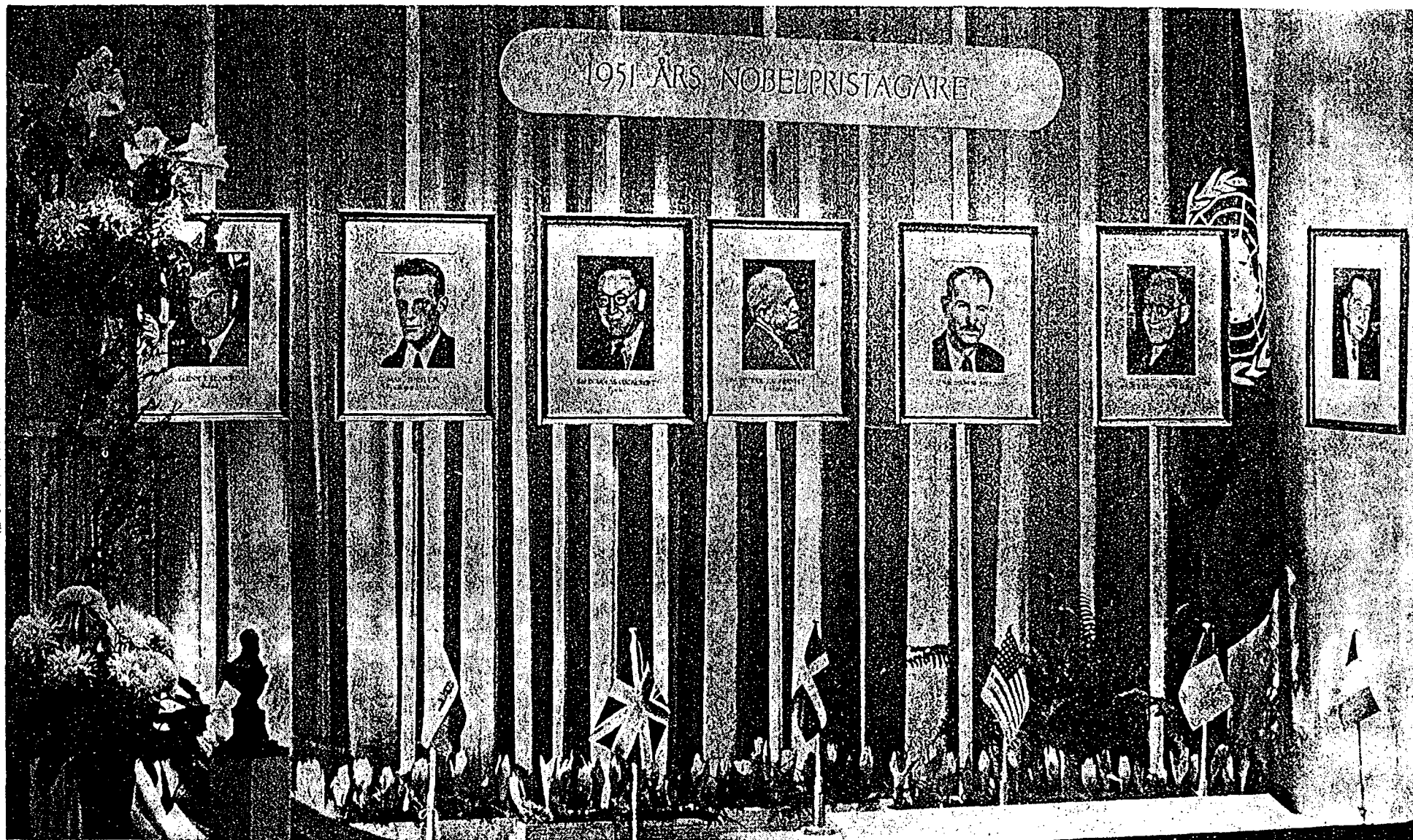
Linus C. Pauling

For his resonance theory of chemical bonds; for his discoveries in the fields of physics, biology, chemistry and medicine; for atomic structures of protein molecules. California Institute of Technology



George H. Shull

For the development of hybrid corn, which has increased the annual corn crop by millions of bushels — believed to be one of greatest food boons of modern times. Faculty member, Princeton Univ.



Das gut aufgemachte Schaufenster der schwedischen IBM-Organisation in Stockholm zeigt die Nobelpreisträger des Jahres 1951 in Zusammenhang mit den Feierlichkeiten der Nobel-Woche in dieser Stadt, während welcher 6 der Preisträger ihre Preise erhielten. Fotos jedes Preisträgers sind über der Flagge seines Landes angebracht, flankiert von Blumen und der Büste des Dr.

Alfred Nobel sowie der Fahne der Vereinigten Nationen. Von links nach rechts: Dr. Glenn T. Seaborg, Chemie; Dr. Max Theiler, Physiologie und Medizin; Sir John Cockcroft, Physik; Par Lagerkvist, Literatur; Dr. Edward M. McMillan, Chemie; E. T. S. Walton, Physik, und Leon Jouhaux, Nobel-Friedens-Preis. Mr. Jouhaux erhielt den Nobel-Friedens-Preis in Oslo/Norwegen.

FRESNO BEE

UC Criminologist Will Speak Here Tonight To Alumni

Austin H. MacCormick of Berkeley, a nationally known criminologist, will speak tonight to Fresno district alumni of the University of California at a meeting in the Californian Hotel.

MacCormick, a professor of criminology in the university, is accompanying the president of Berkeley institution, Robert Gordon Sproul, who will speak and be honored at a dinner at 7 o'clock.

The Sproul party's visit here is one of 10 which will be made to various communities to discuss current projects, problems and programs of the university.

Bear Backers Will Be Hosts

The dinner here is sponsored by the Valley Bear Backers, an alumni group.

MacCormick was appointed by Sproul a year ago this month to head a new instruction on the correctional aspects of criminology. He will speak on A Straight Look At Crime.

He served as an assistant director of the United States bureau of prisons from 1929 to 1933, as commissioner in charge of prisons for the New York City department of corrections from 1934 to 1940 and as executive director of the Osborne Association, an agency for the improvement of prison conditions, from 1949 to the present.

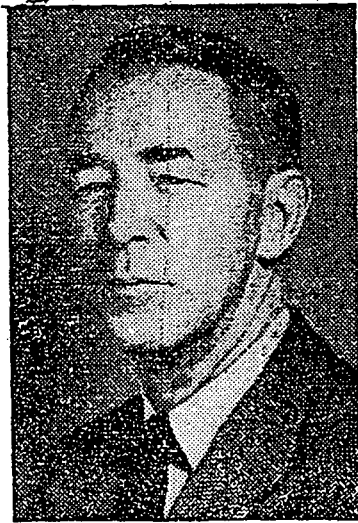
Served As Army Adviser

He also has served the army in an advisory capacity on correctional and parole problems.

James P. Waller, the Bear Backer president, said tickets may be purchased at the door.

He announced Earl J. Fenston, a local attorney and a regent of the university, and Arnold E. Joyal, the president of the Fresno State College, will be among the honored guests.

Others in the Sproul party are Glenn T. Seaborg and Edwin T. McMillan, professors in the university and Nobel prize winners; Stanley E. McCaffrey, the executive manager of the California Alumni Association; Cliff Dochterman, field secretary for the alumni association; Eric Carlisle, a student yell leader; Mrs. McCaffrey and Mrs. Sproul.



Austin MacCormick

FRESNO BEE 2/18/52

Huge Output Of Atomic Energy Is Viewed By Expert

The prediction there may be an atomic plant capable of producing hundreds of thousands of kilowatt hours of power developed within the next 10 years was made here last night by Glenn T. Seaborg, an atomic energy expert and Nobel Prize winner in chemistry.

Seaborg made his prediction at a dinner in the Californian Hotel given by Fresno area University of California alumni honoring the university's president, Robert Gordon Sproul.

Fellow scientist Edwin M. McMillan, also a professor at the Berkeley institution, spoke on byproducts of atomic energy.

Seaborg said his estimate is merely a guess and will depend on the solving of many difficult problems concerning industrial development of nuclear energy.

He also forecast that an appreciable portion of the world's power may be nuclear developed in the next 20 years.

"Nuclear energy differs from chemical energy in that it involves the rearrangement of the nuclei of the atom whereas chemical energy involves the rearrangement of atoms," he said.

"Uranium is the key element in nuclear fission and undergoes reactions which are perpetuated into chain reaction. In the complete fission of a pound of uranium the energy produced is equivalent to the burning of 2,000 tons of coal."

Seaborg held up a pound of uranium to illustrate its size. It

was a little larger than a cigarette match box.

McMillan and Seaborg are co-discoverers of plutonium through which uranium is converted into energy. McMillan is a professor of chemistry and Seaborg a professor of physics.

Not Suitable

Seaborg said the conversion into energy of uranium involves many difficult problems.

"A machine must be used of uniform elements which do not absorb neutrons," he revealed. "Water, steel and other well known materials are not suitable."

"The weight of such a machine limits its use and points it toward stationary use."

He said the first such machine may be used in a remote part of the world where the transportation of fuel is an important factor.

"Mobile units must be able to carry from 50 to 100 tons of weight," he said. "Airplanes and ships are in the future picture of nuclear energy but perhaps not automobiles."

"Another factor to be considered is whether atomic energy can be economically competitive with coal and other present forms of energy."

Tracer System

McMillan said an important by-product of atomic energy is the development of a tracer system which will aid in research.

He illustrated with the example of mice in two infested buildings.

"To find out if the mice are commuting you tie a pink ribbon to their tails," he said. "So you tie a pink ribbon to the tail of an atom and trace it with a geiger counter."

"The tracer method is invaluable in research in industry, agriculture and medicine. You may determine, for example, how long it takes a fertilizer spread around a plant to affect the plant's growth."

Cites Need

Sproul praised his "quiz kids," as he called the atomic professors, but told alumni there exists a great need in the world for education of the average man.

"A university should not be set apart from society," he said, "and the alumni can make many benefits to the university as they grow more numerous."

Austin H. MacCormick, a professor of criminology at the Berkeley University, said he hopes for the day when a crime trial will mean a search for the truth instead of a contest between a prosecutor and a defense lawyer.

Fresnan Praised

Stanley McCaffrey, the executive manager of the California Alumni Association, praised Lloyd Whitman of Fresno for his work on the alumni scholarship committee.

Guests at the dinner included Arnold E. Joyal, the president of the Fresno State College; Assemblymen Wallace D. Henderson (D) of Fresno City district, and William W. Hansen (R) of the Fresno County rural district.

The touring party today went to Porterville for a luncheon in the Legion Hall. Tonight they will be in Bakersfield. The tour, which began last Sunday, will end in Los Angeles Sunday.

Albert M. Paul, a vice president at large of the alumni association, was the toastmaster.

Cal Alumni to Hear University Speakers

BAKERSFIELD
CALIFORNIAN

Dr. Sproul to Be Guest at Dinner

2/13/52

University of California alumni in Kern county will hear talks on a variety of subjects tonight at the dinner meeting for Robert Gordon Sproul, president of the university. The dinner will be held in the Palm room of the Bakersfield Inn.

Three professors and the executive manager of the alumni association will accompany Sproul to Bakersfield which they are visiting on their alumni tour of central and southern California.

Glenn T. Seaborg professor of chemistry, will speak on "Atomic Energy," and Edwin M. McMillan, professor of physics, will discuss the Nobel prize. Seaborg and McMillan shared the 1951 Nobel prize in chemistry.

"A Straight Look at Crime" will be the topic of Austin H. McCormick, professor of criminology, while the California Alumni Association will be represented by Stanley E. McCaffrey who is the executive manager of the association.

Main Speaker

President Sproul will give the main address of the evening, presenting an over-all view of the



GLENN T. SEABORG
... speaks tonight

status of the university today. Other members of the tour party are: Eric Carlyle, student yell leader; Clifford Dochterman, alumni field secretary; Mrs. Sproul, and Mrs. McCaffrey.

Today, Joe Shea, president of the Kern County California Alumni Club, announced the members of the reception committee for the dinner as follows: Mr. and Mrs. David M. Biggar, chairman; Messrs. and Mesdames Charles Linfesty, Louis Deadrich, Don Kinney of Taft, Leonard Seaman, Miguel de LaVeaga, Thomas Fitzgerald, Charles West, Joseph Le Conte, Monte Reedy of Taft, Roy Farrell of Shafter; Miss Ysabel Forker; and Messrs. Hugh Jewett and Phillip Wagy.

Faculty members accompany Sproul on annual alumni tour

DAILY CAL. 2/13/52

Robert Gordon Sproul has started his annual tour of University alumni.

Visiting ten California communities in one week, Sproul has announced that he makes these tours "with the intention of making my person the visible unity of the University."

Sproul will follow the tradition of being accompanied on his tour by several leading professors and other prominent figures of the Berkeley campus.

The professors will be Austin McCormick, nationally known penologist and professor of criminology; Glenn T. Seaborg, professor of chemistry and co-winner of the 1951 Nobel prize in chemistry along with the third faculty member on tour, Edwin M. McMillan, professor of physics.

Stanley E. McCaffrey, executive manager of the Alumni association; Clifford Dochterman, field secretary of the association; Eric Carlyle, ASUC yell leader; Mrs. Sproul and Mrs. Stanley McCaffrey will also be members of the tour party.

Towns visited on the tour will be San Mateo, Carmel, King City, Paso Robles, Fresno, Porterville, Bakersfield, Santa Barbara, San Diego and Los Angeles.

The Los Angeles meeting on Feb. 17 will be an all day affair with informal seminar discussions led by the faculty members of the tour and with other professors joining the program from the various campuses of the University.

H. E. Woodworth, local farmer, trustee of the Kern County Union High School District, and himself a former university professor, will be the master of ceremonies.

Those unable to attend the dinner are invited to come to the Palm room between 8 and 8:15 p.m. to hear President Sproul and members of his party.

Atom Peace Use 20 Years Away Says U.C. Head

Professors Accompanying Dr. Sproul To Alumni Association Parley

By EDMUND RUCKER

It will be two decades before atomic energy can be used with industrial machines, and the slowly automobile never will be driven by the atom's energy, a University of California scientist declared here last night.

He was Dr. Glenn T. Seaborg, professor of chemistry at the University of California and one of two Nobel prize winning U. of C. faculty members who accompanied Dr. Robert Gordon Sproul, university president, to San Diego on his semi-annual tour of Southern California towns that have alumni associations. A faculty professor of criminology also spoke.

ESTIMATES DELAY

Talks on their work with nuclear or atomic energy were given by the two 1951 Nobel prize winners — Dr. Seaborg and Dr. Edwin M. McMillan, professor of physics. Their Nobel award was for work as co-discoverers of plutonium and elements 97 and 98.

Dr. Seaborg said probably it would be two decades before atomic energy could be used with

industrial machines. The engineering problems are very difficult, he said. He said the automobile would never be driven by atomic power because a shield weighing 50 tons would have to be carried to protect human passengers. Atomic energy would be used only for heavy ocean-going vessels.

MORE CRIME IN U.S.

Dr. McMillan attempted to explain in lay language the construction and use of the cyclotron which smashes the nucleus of the atom. He also gave a brief history of the 98 known basic chemical elements.

Criminologist Austin McCormick, who heads a new program at the university, said there is much more crime in America than in any other civilized country. He cited figures of the F.B.I. that there were 1,800,000 serious crimes in the nation in 1950.

5000 CRIMES HERE

Turning to San Diego, he said in that year there were more than 5000 crimes here, not counting embezzlement or arson. The cost of this vast amount of crime he said was impossible to com-

pute, but it could be measured to a certain degree in the cost of insurance, of jails and police forces, and in the direct losses of victims.

McCormick divided crimes into categories beginning with "white collar," which includes such stealing as is represented by the Insull empire. It includes all crime involving political influence like that recently exposed in the Internal Revenue Department.

RACKETEERS INSIDIOUS

Another category is the rackets which he called the "most insidious and menacing" of all. He likened the rackets to a cancer. He praised the California Crime

Commission for its effective work in lessening the power of the "crime syndicate" in this state.

A third category he called the "extraordinary crime" typified by the Black Dahlia murder. The body of the victim in this case was horribly mutilated. But the feature of it that made it bizarre was the great number of bogus confessions which the police had to track down. "There were no less than 34 persons who admitted they killed the Black Dahlia," McCormick reported. "And strangely enough not one was insane. One was a Wave and one a Wac."

McCormick said teen age drug addiction is a serious problem es-

pecially in San Diego County. "Marijuana is coming into California from Mexico like hay," he declared.

35,000 STUDENTS

Dr. Sproul told the dinner meeting at the Cuyamaca Club that the university now has 35,000 full-time students, the largest number of any educational institution in the world. There are eight campuses and the ratio of students to teachers is 18 to 1 which Dr. Sproul said is as low as any leading university. California ranks first in the number of Nobel prize winners on its faculty—six.

He told of a new counseling service the university has set up



Anderson Borthwick, president, First National Bank, extreme right, appears to be telling Dr. Robert Gordon Sproul, president of the University of California, center, about a big fish he caught. Others in the group at the Cuyamaca Club last night were, left to right, Austin H. McCormick, criminologist; Dr. Edwin M. McMillan, professor of physics, and Dr. Glenn T. Seaborg, professor of chemistry.

DAILY PRESS TRIBUNE

SOUTH GATE

THE ONLY DAILY NEWSPAPER PUBLISHED AND PRINTED IN SOUTH GATE — A.P. WIRE — PICK OF THE NATION'S FINEST FEATURES

Vol. XXXII, No. 34 8115 Seville Ave., South Gate, Calif. Monday, Feb. 18, 1952 Phone LO. 8-4347 By Carrier 65c Per Month Single Copy 5

Dr. Glenn Seaborg, Nobel Prize Winner, Pays Visit To Home Town, South Gate

By JACK BOETTNER

"See that corner over there? That's where Glenn used to put in his long hours on his chemistry. And that's his desk. Glenn never had time to run around much at night. Always busy in his books. He'd go to a show once in a while, but that's about all."

It was Theodore Seaborg of 9237 San Antonio avenue, South Gate, speaking in his slow, friendly manner, of his famous son, Dr. Glenn Seaborg, Nobel prize winner, who was making his first visit home in a long time.

"I remember when we used to have friends over and we'd get a little noisy," the long-time local resident smiled. "Glenn'd get up from his desk, come over and turn the radio up loud. Then we knew it was time to move. Radio didn't bother him."

We were visiting in the living room of the modest white frame Seaborg house Saturday night as the aroma of home cookin' drifted in from the kitchen.

It's a long time from the tiny home on San Antonio avenue to the King's palace in Sweden, but that's the record of Dr. Glenn T. Seaborg.

A tall, gaunt man in shirt sleeves strode into the room.

"I'm Glenn Seaborg," he said warmly.

We shook hands and sat down. Seaborg, 39, recently returned from Stockholm, Sweden, where he and Dr. Edwin M. McMillan were presented a joint Nobel prize award for their work in chemistry.

WONDERFUL TRIP

"It was a wonderful trip," the home-spun University of California professor said. "We flew over and back. The presentation of the award by King Gustav is something to remember. There were 2000 in white ties and tails. Then the next night the King threw a big celebration in the palace."

Dr. Seaborg explained that conditions in Sweden are "all right, but it isn't so good in some of the other countries we visited."

Dr. Seaborg currently is on a speaking tour of California cities with Dr. Robert Sproul, president of the U. of California; Dr. McMillan and Dr. Austin H. McCormick, criminologist. The unit is addressing California alumni groups.

SEABORGS DUST OFF FAMILY ALBUM



DR. GLENN SEABORG (center), co-winner of the Nobel Prize for Chemistry in 1951, glances over family album with his parents Mr. and Mrs. H. Seaborg of 9237 San Antonio avenue, South Gate. Dr. Seaborg, a chemistry professor at the U. of California, visited here Saturday night.

—Press-Tribune photo engraving

0042

Glenn received his first formal schooling at Victoria Avenue School. He journeyed to Jordan High School.

"South Gate High School wasn't finished yet when I started to high school," the world-renowned chemist pointed out. "It was completed before I was graduated from Jordan, however."

EDUCATION GAINED

Seaborg obtained his bachelor's degree from UCLA and his master's and Ph.D from the U. of California. He took a position as professor of chemistry at California in 1934. Since that time, except for a war-time interlude, 1942-46, Seaborg has been associated with the chemistry teaching staff at the Berkeley institution.

During the four-year war span, Dr. Seaborg indicated that he was working on the "Manhattan project."

"In other words," he said, "we were involved in research in connection with the atom bomb."

Dr. Seaborg and his wife, Helen, live near Berkeley. They have four children—Peter, David, Stephen and Lynne.

The Nobel prizes are awarded under the will of Alfred Bernhard Nobel, Swedish chemist and engineer, who died in 1896. The interest of the fund is divided annually among the persons who have made the most outstanding contributions in the field of physics, chemistry and physiology or medicine, who have produced the most distinguished literary work of an idealist tendency, and who have contributed most toward world peace.

Dr. Seaborg and Dr. McMillan were honored for the year 1951.

MAR 20 1952



DR. GLEN T. SEABORG
Noted chemist to speak

1951 Nobel Prize Winner to Present Paper Before ACS

Dr. Glen T. Seaborg, recipient of the Nobel prize in chemistry for 1951, is co-author of a paper, "Masses of Translead Nuclides," to be presented at the 121st national meeting of the American Chemical Society in Buffalo, Sunday through Thursday. The paper will be presented before the society's division of physical and inorganic chemistry at the Monday afternoon session.

Dr. Seaborg, professor of chemistry at the University of California, was foster lecturer, at the University of Buffalo in 1951. He is chairman of the division of physical and inorganic chemistry of the American Chemical Society. He is most noted as co-discoverer of plutonium, the atomic fuel, and of the four other transuranium elements found to date—americium, curium, berkelium and californium. He is also co-discoverer of several artificial radioactive isotopes of plutonium, uranium, neptunium and other members of the radioactive series.

Dr. Seaborg has won numerous medals and honors other than the Nobel prize. He at present is engaged in research work on the transuranium elements and on identification of various high energy nuclear

products formed during the operation of the University of California's 184-inch cyclotron. He also directs the work of a group of graduate students in nuclear chemistry and gives lecture courses in this field.

Dr. Seaborg will be a guest on the University of Buffalo roundtable on Saturday at 7:30 p.m. over Station WBEN-TV.

Fem Nobelpristagare samlade i svenska generalkonsulatet i S. F.

VESTKUSTEN 3/10/52



Sittande (från vänster till höger): Professorerna Glenn T. Seaborg (nobelpristagare i kemi 1951), Ernest O. Lawrence (fysik 1939), Edwin M. McMillan (kemi 1951). Stående: Professor Wendell M. Stanley (kemi 1946), Norges generalkonsul Jörgen Galbe, Viceamiral J. L. Hall Jr., generalkonsul Manne Lindholm, professor Wm. F. Giaouque (kemi 1949), Matson Linjens direktör Wm. P. Roth och konteramiral chefen för 12:te marindistriktet, konteramiral Bertram J. Rodgers.

I torsdags hade generalkonsul och fru Manne Lindholm inbjudit de två senaste Californiabor som erhållit Nobelpris i kemi 1951, professorerna Glenn T. Seaborg och Edwin M. McMillan, till en middag i generalkonsulatet, där bland hedersgästerna även märktes Nobelpristagarna prof. Wendell M. Stanley (kemi 1946), prof. Wm. F. Giaouque (kemi 1949)

och cyklotronens uppfinnare prof. Ernest O. Lawrence (fysik 1939). Av de 8 nobelpristagarna i California äro alla de ovannämnda knutna till University of California och det är nog första gången som fem Nobelpristagare samtidigt hedrats av en Sveriges representant utanför hemlandets gränser.

Middagen blev lyckad och historisk.

Generalkonsul Jörgen Galbe representerade sitt hemland Norge, som utdelar fredspriset för Nobelstiftelsen. Dr Seaborg och prof. McMillan berättade för de övriga gästerna om de storslagna arrangemang som gjordes i Stockholm för den högtidliga ceremonien och gala banketter som äger rum under Nobelpristagarnas besök i Stockholm.

BUFFALO, N. Y.
NEWS
MAR 22 1952

Dr. Seaborg Believes A-Energy's Biggest Value Is in Medicine

"The medical atomic age has arrived," the 1951 co-recipient of the Nobel Prize in chemistry, Dr. Glenn T. Seaborg, 39, told a Buffalo Evening News reporter this morning in the Statler Hotel.

The lanky young chemist, who will read a paper before an American Chemical Society convention at the hotel next week, is the co-discoverer of plutonium and the four other transuranium elements found to date. He is a professor in the department of chemistry and the director of the Radiation Laboratory at the University of California.

Dr. Seaborg placed the medical uses of atomic energy ahead of its value as power for the present and said that "even in the long-range view, the uses of tracers in medicine, science and industry will probably bring greater benefits to mankind."

Though he described himself as a "basic" scientist, Dr. Seaborg explained that he was interested in atomic power as fuel.

"Atomic power probably has a place in industry, but it is not now foreseeable that it will supplant other sources. It will merely augment them," he said.

On the U. S. development of industrial atomic energy through the Atomic Energy Commission, he struck a note of mild impatience. "The program is going at a satisfactory rate, but it is still reasonable to hope that it were going faster." Caution in experimentation, he felt, slowed down advances.

Admitting there were difficulties in improving the program, he hoped there might be "a greater willingness to experiment with the construction of reactors before every conceivable problem has been solved."

Dr. Seaborg, referring again to atomic-energy power, revealed that the reactor proving grounds at Arco, Ida., had duplicated the "stunt" of British atomic scientists at Harwell by generating electrical power for a day or two in December 1951.

The boyish-looking scientist will appear on the University of Buffalo Round Table, discussing "Chemistry Looks to the Future," at 7:30 o'clock tonight on WBEN and WBEN-TV.

Atom Energy More Valuable In Medicine, Says Nobel Winner

ROCHESTER DEMOCRAT AND CHRONICLE 5/23/51

Buffalo—(AP)—A 1951 co-recipient of the Nobel Prize in chemistry declared yesterday that the value of atomic energy was greater in the field of medicine than in the field of industrial power, at least for the present.

"Atomic power probably has a place in industry but it is not now foreseeable that it will supplant other sources," Dr. Glen T. Seaborg told a newsmen. "It will merely augment them."

Seaborg, professor of chemistry at the University of California and co-discoverer of the element plutonium, is in Buffalo for the 121st national meeting of the American Chemical Society. The four-day meeting opens tomorrow.

Seaborg said in discussing the peacetime uses of atomic energy that "the medical atomic age" already had arrived. Even from the long range point of view, he said, the uses of

tracers in medicine, science and industry probably would bring greater benefits to mankind than atomic power.

(The path of radioactive substances developed through atomic research, for example, can be followed through the human body as an aid in tracing the course of disease).

Seaborg will present one of the several hundred reports and papers to be given at the meeting.

Nobel Prize Winner at Argonne Lab

Officials of Argonne National Laboratory announced today that Dr. Glenn T. Seaborg, co-winner of the 1951 Nobel Prize in Chemistry, will arrive at the Laboratory tomorrow for the purpose of engaging in special research work and conferring with staff members. He will be at the Argonne Laboratory for approximately two months.

Dr. Seaborg, who was a member of the staff of the Metallurgical Laboratory of the University of Chicago (predecessor of Argonne National Laboratory) during the war years, received the Nobel Prize, with Edwin M. McMillan, for his work on the production and separation of transuranium elements.

Dr. Seaborg predicted the properties of and, with co-workers, produced measurable amounts of plutonium (element 94), americium (element 95), curium (96), berkelium (97), and californium (98). These elements were created in extremely minute quantities and their chemical and physical properties were identified after a tedious process of purification. The development of a satisfactory method of separating plutonium from neutron-irradiated uranium was an important achievement in the history of the atomic energy program and was accomplished under Dr. Seaborg's direction.

A native of Ishpeming, Mich., Dr. Seaborg received his Ph.D. degree in Chemistry at the University of California in 1937 and remained there as a staff member until requested in 1942 to work at the Metallurgical Laboratory. In late 1945, he returned to the University of California where he became Professor of Chemistry and a member of the staff of the Radiation Laboratory.

During his stay at the Laboratory, Dr. Seaborg, his wife Helen, and their four children will reside at 2651 Western Avenue, Park Forest, Ill.

New Chemical Methods Set For Delegates

National Meeting Opens Tomorrow

Three thousand chemists and chemical engineers from all parts of the United States and Canada will gather in Buffalo tomorrow for the 121st national meeting of the American Chemical Society.

New methods for determining the chemical nature of human tissue, more sensitive chemical techniques for measuring air pollution, and the development of super-strong concrete through plastic reinforcement will be among the subjects discussed in more than 300 technical papers to be presented at sessions scheduled by ten scientific and technical divisions of the society during the four-day meeting. The divisional sessions will be held in the Statler, Lafayette and Buffalo hotels. General headquarters will be the Statler.

Dr. Edward U. Condon, former director of the National Bureau of Standards, an authority on nuclear physics, microwave radio, and chemical spectroscopy, and director of research of the Corning Glass Works, Corning, will give the main address. Scientists in Federal Service, at the society's general meeting in the Hotel Statler tomorrow night.

Four annual \$1,000 awards—in pure chemistry, analytical chemistry, the chemistry of essential oils, and chemical education—will be presented to the 1952 winners by Dr. Edgar C. Britton, president of the society. Dr. Britton, who is director of the organic research laboratory of the Dow Chemical Co., Midland, Mich., also will present diplomas honoring members of the society who have completed 50 years of continuous membership.

New chemical developments on the Niagara Frontier will be reported at

a symposium on Tuesday. The use of hydrogen peroxide as a fabric bleach, wood-pulp processing aid, and rocket fuel; the employment of new synthetic polymers in fibers, films, and plastic products and the production of the latest abrasives and super-refractories will be described. Chemicals and allied products in the Buffalo-Niagara Falls area are in third place, under metals and food products, among the area's diversified industries.

Fire-resistant clothing made with phosphate-treated textiles, life processes involving the element phosphorus, and insecticides and lubricants containing phosphorus compounds will be the subjects of a symposium of the Society's Division of Physical and Inorganic Chemistry to be held Tuesday.

Prof. Glenn T. Seaborg of the University of California, 1951 Nobel Prize-winner in chemistry and one of the world's foremost atomic scientists, who is chairman of the division of physical and inorganic chemistry, will present a paper before the division tomorrow describing errors that have occurred in the determination of the chemical atomic weight of uranium, the atomic energy fuel.

Altogether, 12 special symposia will be held during the four-day meeting. In addition, various panel discussions

and general sessions will be sponsored by the divisions of analytical chemistry, biological chemistry, chemical literature, colloid chemistry, history of chemistry, organic chemistry, and polymer chemistry.

General chairman of the session is Dr. Hans O. Kauffmann, director of research and development of the Buffalo Electro-Chemical Co., Inc. Chairman of the local committees in charge of arrangements are as follows: Entertainment, James S. Sconce; equipment and supplies, Wilbie S. Hinegardner; finance, Charles C. Clark; group meals, John P. Wilkins; information and housing, James N. Felger; women's entertainment, Miss Sarah H. Camiolo; meeting rooms, Robert Schuler; personnel, E. Rexford Billings; plant trips, John C. Pernert; publicity, Edward S. Shanley and Marshall W. Mead, and registration, Ford M. Jenkins.

WELLSVILLE, N. Y.
REPORTER

MAR 24 1952

Shortage of Chemists Threat to Security

BUFFALO (AP)—Dr. Edgar C. Britton, president of the American Chemical Society says a shortage of trained chemists and chemical engineers threatens the nation's defense effort and civilian economy.

He made the statement in connection with the opening of the 121st national meeting of the society, which began hearing papers today on new chemical developments.

A committee of 16 members of the society has been named to study the manpower situation and recommend an offsetting program, he said.

Dr. Glen T. Seaborg, a co-recipient of the Nobel prize in chemistry, told a newsmen Saturday that the value of atomic energy of medicine was greater than its potential use as a source of industrial power.

Seaborg will present one of more than 300 papers on new chemical advances to be given at the four-day convention. Also at the meeting, 53 chemists and engineers from all parts of the country will be given diplomas as 50-year members of the society.

U. B. Round Table
BUFFALO EVE NEWS
 Dr. Glenn T. Seaborg, University of California chemical research director and recent Nobel Prize winner, will participate in the University of Buffalo Round Table simulcast on WBEN and WBEN-TV at 7:30 this evening. Others taking part in the panel on "Chemistry Looks to the Future" will be Dr. Edgar C. Britton, president of the American Chemical Society, and Dr. Henry M. Woodburn, chairman of the U. B. Chemistry Department.

New Chemical Methods Set For Delegates

By BUFFALO COURIER-EXPRESS

Three thousand chemists and chemical engineers from all parts of the United States and Canada will gather in Buffalo tomorrow for the 121st national meeting of the American Chemical Society.

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tion of the latest abrasives and super-refractories will be described. Chemicals and allied products in the Buffalo-Niagara Falls area are in third place, under metals and food products, among the area's diversified industries.

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ENTRY JUDGES—Left to right: Dr. Carl D. Anderson, Caltech, and Drs. Glenn T. Seaborg and Edwin M. McMillan, both of the University of California, who will help judge entries in first Southern California Science Fair sponsored by The Times.

Nobel Prize Trio Named as Science Fair Judges

Three Former Los Angeles County Students Assigned to Job in Times-Sponsored Exhibit

Three Nobel Prize winners, all of whom attended high school and college in Los Angeles County, have been appointed judges of the first Southern California Science Fair.

Sponsored by The Times, the exhibit of displays prepared by students in the seventh through 12th grades will be viewed by the public April 19 and 20 in Los Angeles County Museum. The deadline for sending completed entry blanks to the Museum is tomorrow, April 1.

The three Nobel Laureates who will help judge the entries are Dr. Carl D. Anderson, Caltech, and Drs. Edwin M. McMillan and Glenn T. Seaborg, both of the University of California.

Other Scientists

Other scientists appointed to the board of judges include Dr. Ira S. Bowen, director of the merged Mount Wilson and Palomar Observatories; Dr. Robert F. Bacher, head of Caltech's physics division; Dr. Philip A. Munz, botanist and director of the Rancho Santa Ana Botanic Garden; Dr. Robert D. Vold, chairman of the SC chemistry department; Dr. Hildegard Howard, chief curator of science,

Los Angeles County Museum; Dr. Thomas Clements, head of the SC geology department.

Additional judges include John K. Northrop, president of Northrop Aircraft; Dr. Elmer Belt, Los Angeles physician; Frank Capra, motion picture producer who was graduated from Caltech; Clarence Fielstra, assistant dean of education at UCLA; O. R. Hull, dean of the school of education at SC, and R. F. Faull, manager of the La Habra Laboratory of California Research Corporation. One or two more judges may be appointed later.

800 Entry Blanks

Over 800 entry blanks for the fair have been received by Miss Gretchen Sibley, science instructor at Los Angeles County Museum who is Science Fair chairman. She is prepared to answer questions from teachers and others regarding the event.

The committee which selected the judges picked a panel which includes representatives of many branches of science, and educators and laymen capable of judging the dramatic effectiveness of exhibits.

SYRACUSE, N. Y.
HERALD-AMERICAN

MAR-23 1952

'Medical Atomic Age' Has Arrived, Chemist Asserts

BUFFALO (AP)—A 1951 co-recipient of the Nobel Prize in Chemistry declared yesterday the value of atomic energy was greater in the field of medicine than in the field of industrial power, at least for the present.

"Atomic power probably has a place in industry but it is not now foreseeable that it will supplant other sources," Dr. Glenn T. Seaborg, professor of chemistry at the University of California and co-discoverer of the element plutonium, is in Buffalo for the 121st national meeting of the American Chemical Society. The four-day meeting opens tomorrow.

Seaborg said in discussing the peacetime uses of atomic energy that "the medical atomic age" already had arrived. Even from the long range point of view, he said, the uses of tracers in medicine, science and industry probably would bring greater benefits to mankind than atomic power.

Atom Scientist is New Villager

PARK FOREST REPORTER

5/8/52

Dr. Glenn Seaborg, eminent atomic chemist and 1951 Nobel prize winner will become a temporary Park Forest resident next week when he and his family move into the former Philip Klutznick residence at 2651 Western avenue, for a two-months stay. Demonstrating true village civic spirit, the Klutznicks vacated their home ahead of schedule to accommodate the Seaborgs and their four children.

A professor of chemistry in the University of California's famed Radiation Lab, Dr. Seaborg has returned to his native midwest for a series of conferences with members of the staff of the Argonne National Laboratory and for special research at the laboratory. From 1942 to 1946, Dr. Seaborg worked on pioneer phases of atomic research in the Metallurgical Lab at the University of Chicago, the predecessor of Argonne.

In 1940, Dr. Seaborg, who had been a faculty member of the University of California since receiving his Ph.D. degree there in 1937, began a decade of discovery which added five elements to the 93 previously identified in the entire history of science. He collaborated in the discovery of plutonium in 1940, then americium, curium, berkelium, and in 1950 californium, element 98. The highly important process of separating plutonium from uranium was developed under Dr. Seaborg's direction.

This Clipping From
OIL, PAINT & DRUG REPORTER
NEW YORK, N. Y.

JUN 2 - 1952

Electron Transfer, Isotope Symposium Set June 11-13

A three-day technical symposium on "Electron Transfer and Isotopic Reactions" will be held June 11 to 13 under the joint sponsorship of the American Chemical Society's division of physical and inorganic chemistry and the American Physical Society's division of chemical physics at the University of Notre Dame. A total of twenty-three papers will be presented.

Prof. Glenn T. Seaborg of the University of California, who received the 1951 Nobel Prize for chemistry, is chairman of the ACS division of physical and inorganic chemistry. Another Nobel Prize winner, Prof. James Franck of the University of Chicago, who received the physics award in 1925, will speak at the opening session on the morning of the eleventh on "The Franck-Condon Principle in Electron Transfer Reactions."

Dean Henry Eyring of the University of Utah Graduate School will deliver a paper at a later session entitled, "The Significance of Isotope Reactions in Rate Theory." Dean Eyring is winner of the 1951 William H. Nichols medal.

Seaborg to Represent U.C. On Conference Group

By ED SCHOENFELD

It's a long way from nuclear chemistry to such items as touch-downs, home runs and 100-yard dashes, but one of the world's great atomic experts made the move today in Berkeley.

Dr. Glenn T. Seaborg, the University of California's Nobel Prize-winning chemistry pro-

fessor, turned his attention from the 60-inch Berkeley cyclotron to intercollegiate athletics.

The noted chemist accepted an appointment as the University of California's faculty representative to the Pacific Coast Intercollegiate Conference.

AVID SPORTS FAN

Chancellor Clark Kerr announced Seaborg has succeeded Dr. Stanley Freeborn, who served in the capacity for 12 years. Freeborn was recently appointed provost of the university's Davis extension.

The 40-year-old Seaborg—who admits to being an avid sports fan, a former sandlot softball and football player, but never a collegiate athlete—let it be known right from the start . . . he won't be a crusader in sports.

"I would like it to be known that I am not taking this job with any pre-conceived plans in mind," he declared. "I feel that athletics play a worthwhile part in the university life."

Athletic officials and sports fans who fear educators might

de-emphasize intercollegiate athletics have nothing to worry about in the university's new faculty representative.

"I think that if our intercollegiate athletic program is carried on properly, which is at the present level, there is no further need for any de-emphasis," stated Seaborg.

The chemist said he had "mixed feelings" about post-season football games, such as the Rose Bowl game at Pasadena on New Year's Day.

"Personally, I enjoy attending post-season games," declared Seaborg, "but I want to be sure they fit into the academic spirit and tradition and there is no abuse in it."

Calling himself a "rookie," Seaborg said he hopes to lean heavily on Freeborn for assistance during the first Pacific Coast Intercollegiate Conference meeting, December 7 to 11 at Pasadena.

EYE ON SPORTS

"I hope Dr. Freeborn will carry the ball and allow me to work into the job," he said.

Despite his important scientific work, Seaborg always has allowed himself to keep an eye on sports.

"Yes, you can say I'm quite a sports fan," stated Seaborg.

"Football is my favorite, but I also like to take in basketball games and track meets here at

the university.

"By the way, how do you like the way the 49ers are doing? I guess I hit it right this time because I have a season ticket to all the 49ers' home games."

Seaborg was talking about the San Francisco 49ers, the hottest team in the National pro league this season.

There are two reasons Seaborg wasn't an athlete at U.C.L.A. He admits one of them—"I wasn't heavy enough to play football." The other is found in his news clippings—he was too busy serving in a series of widely-varied jobs, which helped pay his way through school.

"Although I've always had a great interest in sports, my only experience was playing softball and football on corner lots as a youngster in Los Angeles," reported Seaborg.

U.C.L.A. GRADUATE

The chemist is well fitted for his job with the Pacific Coast Intercollegiate Conference because he had all his schooling in two of its member institutions. Seaborg graduated from U.C.L.A. in 1934 and three years later received his PhD at the University of California.

Except for three years during the war when he was doing scientific work for the Government,

Oakland Tribune, Monday, Nov. 3, 1952



Tribune photo

Dr. Glenn T. Seaborg (right), University of California professor of chemistry, confers with Brutus Hamilton, A.S.U.C. director of athletics, on his new job of faculty representative to the Pacific Coast Intercollegiate conference.

Seaborg has been on the Berkeley campus. He has been a full professor in chemistry since 1945.

He was a co-winner of the Nobel Prize last year for his discovery of plutonium.

Chancellor Kerr, in announcing Seaborg's appointment, declared:

"It is a remarkable tribute to the quality of the athletic program at the University of California that one of our most distinguished scientists replaces one of our distinguished scholars and administrators, Dr. Freeborn. Here at the university we have maintained a careful balance between the demands of top-flight collegiate athletic competition and the academic requirements of a fine university.

SKILL PRAISED

"It is due in no small part to the skill and integrity of Brutus Hamilton, and our excellent coaching staff, and that this proper proportion has prevailed. Hamilton and his staff have been greatly aided in this work by the co-operation of such talented and interested people as Dr. Freeborn. I am sure Dr. Seaborg will continue the excellent work done by Dr. Freeborn."

Hamilton, director of the university's intercollegiate athletic program, hailed Seaborg's appointment as "great for sports."

"I am very pleased that a man of Dr. Seaborg's stature has evidenced enough interest in our intercollegiate athletic program and enough sympathy with sports to take this job," declared Hamilton. "He will be a worthy successor to a worthy man, Dr. Freeborn."

CHEMICAL SOCIETY MEETS TOMORROW

8,000 Due in Atlantic City for
122d National Convention—
1,046 Papers to Be Read

Special to THE NEW YORK TIMES.

ATLANTIC CITY, Sept. 13—The American Chemical Society estimated here today that close to 8,000 chemists and chemical engineers would attend technical and scientific sessions of the 122d national meeting of the society, which will open Monday morning. A record total of 1,046 technical papers will be read before nineteen divisions of the society.

Topics will range from better weed killers to screening techniques for compounds that might conquer cancer.

Monday night, at a general assembly of the society, Dr. Edgar C. Britton of Midland, Mich., president of the society, will discuss "Our Stake in Research."

At the session the Priestley Medal, highest honor in American chemistry, will be presented to Dr. Samuel Colville Lind of the Oak Ridge National Laboratory, Oak Ridge, Tenn.

Dr. Lind, a past president of the society and dean emeritus of the University of Minnesota Institute of Technology, is an authority on radium and radioactivity. He is now on the staff of the Carbide



CHEMISTS' PRESIDENT: Dr. Edgar C. Britton, who will preside at 122d convention of American Chemical Society in Atlantic City today.

and Carbon Chemicals Company, which operates the Oak Ridge Laboratory. Dr. Lind will discuss "Chemistry at Mid-Century."

Dr. Britton also will announce the names of winners of ten other awards that are administered by the society. Dr. Britton is director of the organic research laboratory of the Dow Chemical Company. The awards will be presented at the Society's 123d meeting in Los Angeles next Spring.

A memorial program arranged by the division of sugar chemistry to mark the 100th anniversary of the birth of two famous European chemists will open Monday. The program will honor Emil Fischer, German biochemist noted for his work on the synthesis of carbohydrates, and Jacobus Henricus van't Hoff, Dutch chemist known for work on the theory of solutions.

Dr. Glenn T. Seaborg of the University of California, co-discoverer of plutonium who won the Nobel Prize last year, will speak on the transuranium elements at a symposium on nuclear chemistry Tuesday.

Food needs and food laws is the theme of a luncheon address to be given Tuesday by Dr. Bernard L. Oser of the Food Research Laboratories, Inc., Long Island City. The agricultural and food chemistry division will hold a symposium on dietary foods Friday.

Headquarters for the meeting will be the Traymore Hotel.

Portrait of a University

Six Nobel Prize Winners

This is the story of the University of California—what it is, what it does and the people responsible for getting it to its present eminence among the world's great scholastic institutions.

By **ROBERT de ROOS**
Chapter Seven

UNTIL 1934, the University of California was an aggressive sort of place, situated in a pleasant State. Californians were proud of the place, but you know how Californians are . . .

In 1934, however, the American Council of Education asked 2000 leading scholars of the United States to analyze the graduate schools of the country's universities.

The survey covered 36 fields of learning and the selected savants were asked to rate the universities on the basis of their "distinguished" or "adequate" departments.

When the results came singing in, they shocked Eastern universities right out of their ivy.

It must be admitted that men at Cal were as surprised as anyone else. And pleased.

For the survey showed the University of California had as many distinguished and adequate departments as any university in the country.

Harvard had two more departments on the distinguished list but UC had more on the adequate list than Harvard.

"If" people at UC were quick to point out, "the results were weighted with two points given for every distinguished department and one point for every adequate department, Harvard and the University of California would rate exactly equal."

The Top Class

"Since, then," says George Pettit, administrative assistant to President Sproul, "other studies of other phases of the university have been made and it is clear that the university is among the top four universities in the country."

You will note there is no talk here of size. Quality is the measure.

In 1944, the American Library Association surveyed the library resources of the country to discover where the important collections were and

which institutions had the books and other materials scholars must have for their work.

The rating was like this: first, the Library of Congress; second, Harvard; third, the University of California.

"We really were surprised that time," says Pettit, "because, after all, our library was only 80 years old."

There are other measures of greatness. The University of California has 45 members of the National Academy of Sciences on the faculty—once again, in the latest tally—second only to Harvard.

The National Academy of Sciences, the granddaddy of them all, was established during the Civil War when Lincoln needed to know where the brains of the Nation were. You've got to be good to be elected and everybody knows it.

Unfortunately, there is no such organization which recognizes scholars at work outside of the sciences—none which compare in prestige, at any rate. The academy is top recognition on the national scene.

The Nobel Winners

Now for international recognition.

In November of 1951, there was a terrific clatter in the basement of Gilman Hall, the chemistry building of the Berkeley campus. Explosion after explosion rattled through the halls.

"What was that? What was that?" yelled an excited bystander, under the impression that some chemical recipe had gone sour.

"Nothing to worry about," said a passing chemist. "It's just Professor Latimer. He always sets off firecrackers when we get a Nobel prize."

No other university can make this claim. But don't get the idea that the University of California is blasé about it.

It has six Nobel men, more than any other university in the world.

Wendell Latimer's firecrackers in the basement of Gilman Hall celebrated the notable discoveries of Glenn T. Seaborg, professor of chemistry, and Edwin M. McMillan, professor of physics, for which they were awarded Nobel prizes in 1951.

Dr. Seaborg is the leader of a group of scientists who discovered plutonium (element 94), americium (95), curium (96), berkelium (97) and californium (98). His group figured out the ways to produce plutonium at the Hanford atomic energy plant—and developed a whole new body of knowledge about radioactive materials and heavy elements.

Dr. McMillan discovered neptunium (93) which led to the discovery of plutonium. He also participated in the discovery of plutonium. He developed the theory of phase stability—the basis for gigantic postwar atom smashers—the bevatron and the synchrocyclotron.

The other Nobel laureates on the Berkeley campus are:

William F. Giaque, professor of chemistry, "for his contribution in the field of chemical thermodynamics, particularly concerning the behavior of substances at extremely low temperatures."

In his studies, Dr. Giaque devised a technique for producing temperatures within three thousandths of a degree of absolute zero—which is computed as 459.6 degrees below zero Fahrenheit.

More Winners

Ernest Orlando Lawrence, professor of physics and unquestionably the best known researcher in the university stable was awarded the Nobel prize in 1939 for the invention of the cyclotron. Lawrence is director of the university's radiation laboratory. Both Lawrence and Giaque did their work at Berkeley.

John Howard Northrup, professor of bacteriology, was awarded the prize in 1946 in chemistry for the preparation of pure enzymes. His work was done at the Rockefeller Institute for Medical Research.

Wendell M. Stanley, professor of bio-chemistry and direc-

tor of the university's new virus laboratory. He shared the prize in 1946 with Dr. Northrup and James B. Sumner as recognition of his work in preparation of pure crystalline viruses and his interpretation of their chemical nature. The work was done at the Rockefeller Institute for Medical Research in 1934.

These are the unquestioned stars of the university's firmament.

THE University of California did not become great by happy accident.

It became great because of its ability to attract top rank scholars to its faculty.

It became great because of the Academic Senate, its unique organization which places in the hands of its faculty the primary voice in the selection of new members of the faculty, a large voice in the university budget, and almost the whole say about entrance requirements of students, what they shall study and what they must accomplish to obtain degrees.

It became great because it created an atmosphere of freedom—the freedom of "unrestricted research and uncontrolled interpretation."

It became great because it had enough money.

And it became great because the faculty had some pretty definite ideas as to the kind of men the university needed.

The faculty, and this is equally true of the administration and the Board of Regents down the years, kept the ideal of a true university before them:

A company of scholars gathered together to teach all they know of the world to the oncoming generations—and to make their own contributions to the knowledge of the world.

Choosing a Professor

This view was summed up by Raymond T. Birge, chairman of the physics department:

"Our policy is not to hire anyone who won't be a good teacher. Of course, he has to be a first-rate physicist but

he must be a teacher, too. Some first-rate physicists can't teach."

The faculty chooses the faculty. The membership in the community of scholars starts with the community itself.

If a department believes a new position is necessary, it first submits a request for a budget position to the budget committee of the Academic Senate.

The committee eventually comes up with a one-two-three list of choices for the job, then it is up to President Sproul to go after him.

"The final approval of these men is mine," says Sproul, "and I do not act *pro forma* although I get aid in the selective process from the faculty."

(Sproul tends to talk that way: using "pro forma" and "inter alia" where lesser men might say "according to form" and "among other things." Probably an occupational disease.)

If Sproul rassles his man to the mat and gets an acceptance, the final approval of the Board of Regents is necessary. But the interesting thing is this—the president cannot recommend any man for appointment unless he has the approval of the department involved. Actually, there is a way around this: if Sproul does not like the faculty choice, he can recommend a man of his own to the Regents but must submit the faculty choice also.

The greatest barrier to overcome in seeking scholars is geographical.

"The fact that the UC is 3000 miles away from the 'cultural center of the country' has been a weighty factor," says Dean A. R. Davis of the College of Letters and Science, "and still has not been fully overcome. Sometimes I'm quite amazed at the success we've had."

"It's got to the point where we have built up a scholarly center of high merit and that is not questioned. They say, 'The atmosphere is good but it is restricted to the campus. In the east where there are many institutions, distances are small and we can get together with our colleagues frequently.'"

The university has overcome this argument to a large extent by allowing travel expenses for meetings of learned societies.

Because the Legislature has been generous over the years, the university has been able to compete with Harvard, Yale, Columbia and Chicago for scholars. "Scholars have to make a living," says Davis.



Dr. Glenn T. Seaborg:
Chemistry



Dr. Edwin M. McMillan:
Physics



Dr. William F. Giauque:
Thermodynamics



Dr. Ernest O. Lawrence:
The Cyclotron



Dr. Wendell M. Stanley:
Crystalline viruses



Dr. John Howard Northrup:
Pure enzymes

"Money is always a factor but it is certainly not the only one. Most scholars would not go to an institution where their research and interpretation of that research would be influenced in any way."

C. of C. Please Note

Also, hurray for the California climate.

"Where it is a case of money alone affecting a man's desire," says Davis, "we estimate it practically—there is a difference of from \$1500 to \$2000 in our favor over the New York area."

"A good many people have said, 'Other things being equal, I'd rather come to California for \$10,000 than stay in New Haven for \$12,000.'"

A beginning professor gets \$7920 on a basis of nine months a year at California. There is no stated top limit.

Practically, the highest salary for a straight professorship (without administrative duties) is somewhere around \$15,000—in the law school.

Deans of the large colleges get more than \$15,000 and certain other professors will make as much. On a straight salary basis, Harvard goes to \$15,000. Chicago has some professors making \$18,000—on an eleven-month basis.

About Tenure

Once accepted as a member of the community of scholars, a scholar has certain rights of tenure.

When a man is appointed an associate professor—usually after serving as an instructor and assistant professor, he automatically acquires tenure and cannot be discharged except for moral turpitude, incompetency or proved membership in the Communist party.

There is a second kind of tenure called "moral tenure." This is acquired by the man who is retained on the faculty as an instructor or assistant professor for eight years; he might not be going anyplace academically but he cannot be fired.

Thus is the scholar protected against the capricious action of the administration.

First-rate men are scarce and competition between top-ranking universities is politely brutal.

"One of the nicest compliments I ever got," said Robert Sproul recently, "came from Conant of Harvard. He pointed at me and said, 'There's a man who runs a university from which I can't pull men—but, by God, he can't pull them away from me, either.'"

Discoverer of Plutonium To Receive Award Here

PHILADELPHIA INQUIRER 2/15/53

The present status of that weird world of the Atomic Age—the world of the transuranic elements — will be discussed next Thursday evening at the Franklin Institute by Dr. Glenn T. Seaborg, 1951 Nobel Prize winner in physics and the oft-honored nuclear scientist of the University of California Radiation Laboratory.

Dr. Seaborg will discuss the transuranic world, of which he is the virtual discoverer, after receiving the John Scott Medal from the Board of City Trusts.

The so-called "transuranium" elements are those which lie beyond uranium, the 92d element of the periodic table, the most important of which is the fissionable isotope of plutonium known as Pu-239.

USED IN ATOM BOMB

Although plutonium, one of the two substances from which the atomic bomb may be made, has been proven by Dr. Seaborg to exist in minute traces in nature, all of the others were discovered by very high energy nuclear bombardment of a parent substance and do not exist in nature. Each, however, has distinct chemical properties.

Dr. Seaborg, who was not yet 30 when in 1941 he discovered plutonium—substance of the bomb which obliterated Nagasaki on July 9, 1945—is being honored by the Board of City Trusts for his "discovery and invention" of five transuranic elements: plutonium, americium, curium, berkelium and californium, respectively Nos. 94 through 98 in the periodic table.

CHEMICAL SOCIETY DINNER

The Scott Medal will be presented to Dr. Seaborg at a dinner in the Franklin Institute being given by the Philadelphia section of the American Chemical Society. The presentation will be made by Ernest T. Trigg, vice president of the Board of City Trusts.

After discovering that the fissionable fraction of plutonium — that is, one which would split in a chain-reaction with the release of tremendous energy — could be produced by bombarding Uranium 238 with neutrons, Dr. Seaborg played a leading role in working out the complex chemical separation.

This was a vital preliminary step to the construction of the huge plutonium production and separation plant at Hanford, Wash., where plutonium for the Nagasaki bomb and for subsequent weapons in the plutonium series was produced.

Dr. Seaborg received the Nobel Prize for physics in 1951 jointly with

his colleague, Dr. Edwin McMillan, who was his co-worker in the discovery of Element 93, neptunium, and plutonium. When the non-fissionable fraction of uranium—U-238—is bombarded in an atomic reactor with neutrons, it passes through what is known as a nuclear transformation first to the short-lived element neptunium and then to plutonium.

In subsequent work with the cyclotron and more recently with higher-energy "atom smashers," Dr. Seaborg discovered and identified curium in 1944, americium in 1945, berkelium in 1949 and californium in 1950.

PHILADELPHIA, PA.
BULLETIN

FEB 16 1953

Dr. Seaborg to Get John Scott Medal

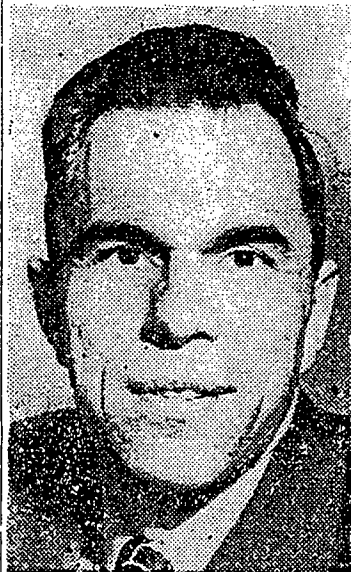
Dr. Glenn T. Seaborg, nuclear scientist, will be given the John Scott Medal Award of the Board of Directors of City Trusts at a dinner of the American Chemical Society in Franklin Institute Thursday evening, the Board announced today.

The presentation will be made by Ernest T. Trigg, vice president of the board, in recognition of Dr. Seaborg's discovery and invention of uranium-related elements such as plutonium, americium, curium, berkelium and californium.

Dr. Seaborg is professor of chemistry and director of chemical research at the radiation laboratory of the University of California. Between 1942 to 1946, Dr. Seaborg worked in the Metallurgical Laboratory of the University of Chicago on procedures employed in the production of plutonium.

Since 1936, he has published more than 100 papers in the nuclear and radioactivity field, and has been the recipient of numerous other honors and awards in connection with them. As part of the presentation ceremony, Dr. Seaborg will deliver an address discussing the present aspects of the new elements and possibilities for further discovery.

Scott Award Presented To Nuclear Scientist



Dr. Glenn T. Seaborg

Special to THE NEW YORK TIMES.

PHILADELPHIA, Feb. 19—
The John Scott Award for 1952 was presented tonight to Dr. Glenn T. Seaborg, Nobel Prize winner in physics, and nuclear scientist of the University of California's radiation laboratory.

The annual award, consisting of \$1,000 and a medal, was given to Dr. Seaborg in recognition of his "discovery and invention" of five transuranic elements: plutonium, americium, curium, berkelium and californium, respectively, Nos. 94 to 98, in the periodic table.

Ernest T. Trigg, vice president of the Philadelphia Board of City Trusts, made the presentation at a dinner given by the American Chemical Society in the Franklin Institute.

In accepting the honor, Dr. Seaborg spoke extemporaneously on the "Present Status of the Transuranium Elements," which are those that lie beyond uranium, the 92d element of the periodic table.



SPEAKER — Dr. Glenn T. Seaborg, Nobel Prize winner, who will address banquet of UC alumni at Riverside.

Alumni to Hear Noted Scientist

WARTER DAY
RIVERSIDE, Feb. 20—Dr. Glenn T. Seaborg, Nobel-prize winning chemist who discovered plutonium and four other elements, will address the charter banquet of the University of California in Riverside Tuesday.

He is considered one of the important pioneers of science for his work with nuclear fuels and radioactive isotopes. He will speak on "The Dawn of the Atomic Age."

The banquet will commemorate the 85th anniversary of the State-wide university.

In addition to discovering plutonium, a discovery which made possible the more powerful atom bomb dropped on Nagasaki, Dr. Seaborg has been responsible for the finding of the elements americium, berkelium and californium.

Philadelphia Honors Dr. Seaborg of UC

The City of Philadelphia honored Dr. Glenn T. Seaborg, University of California nuclear chemist, last night for his work on heavier-than-uranium elements and the discovery of elements 94 to 98.

Dr. Seaborg received Philadelphia's John Scott Award, including \$1000 cash, at a meeting of the Philadelphia section of the American Chemical Society. Dr. Seaborg was a speaker at the awards dinner. *B.F.C. CHRONICLE 2/24/53*

Nuclear Physicist Receives Medal

PHIL. INQUIRER 2/24/53
By JOHN McCULLOUGH

The chemical properties of the next five elements in the so-called "transuranic series" — that is, ele-

ments 99 through 103 — are as well known to scientists today as they will be when they are finally manufactured, Dr. Glenn T. Seaborg, Nobel Prize-winning nuclear physicist of the University of California, told an audience at the Franklin Institute last night.



DR. GLENN SEABORG

Dr. Seaborg, who shared the 1951 Nobel Prize with a fellow scientist for his "invention" of Elements 97 and 98 — berkelium and californium — received the John Scott Medal of the Board of City Trusts after a dinner at which the Philadelphia section of the American Chemical Society acted as host.

If as little as 200 atoms of any of the elements lying beyond californium in the transuranic series can be detected in solution — a bit of matter so minute that, if its atoms were laid end to end, they would measure only about a millionth of an inch — the element's radioactive properties also can be determined, the physicist said.

ALMOST EXACT ANALOGUES

Precise prediction of the chemical properties of the as yet undiscovered elements beyond 98 is made possible, he explained, because they are almost exact analogues, chemically, of their "partners" among the rare earths. Chemically, berkelium is the analogue of Element 65, terbium; californium, of Element 66, dysprosium. Therefore, elements 99 through 104 should have the chemical properties of holmium, erbium, thulium, ytterbium, hafnium and tantalum, respectively.

From there on, Dr. Seaborg said, the chemical "invention" of transuranic elements will be more difficult, as their "half-lives" — that is, the period within which a radioactive element loses one-half of its energy — become shorter and shorter.

Until Dr. Seaborg and his associates began investigating 13 years ago the possibility of "manufacturing" by nuclear bombardment elements heavier than the heaviest known element then occurring in nature — uranium, or Element 92 — uranium was the end of the line in the periodic table of elements.

ELEMENTS RADIOACTIVE

Neptunium, a brief-lived element which decays into plutonium, was the first element above uranium with distinct chemical properties to be discovered. The so-called "fissionable" isotope of plutonium — that is, the form of plutonium which is used in the atomic bomb — came later. There then followed, from 1944 through 1950, americium, curium, berkelium and californium.

All of these elements are radioactive, and their half-lives vary greatly. Curium, for instance, gives off its radioactivity at such a rapid rate that it actually disintegrates water in which it is suspended.

At present, Dr. Seaborg said, the Radiation Laboratory at Berkeley is concentrating upon producing heavier isotopes of the presently known transuranic elements with much longer half-lives, in order that their chemical properties may be fully investigated.

Dr. Joseph W. E. Harrison, chairman of the Philadelphia section of the American Chemical Society, presided at the ceremony. The John Scott Medal was presented by Ernest T. Trigg, vice president of the Board of Directors of City Trusts. The citation accompanying it was read by John W. Iliff.

Dr. Glenn Seaborg, U.C. Nobel Scientist, Wins \$1000 Award

OAKLAND TRIBUNE
BERKELEY, Feb. 20. — Dr. Glenn T. Seaborg, Nobel award winning University of California nuclear chemist, last night was presented the John Scott award by the City of Philadelphia. The award, which carries a stipend of \$1000, was presented

at a meeting of the Philadelphia section of the American Chemical Society, which Dr. Seaborg addressed.

The scientist was selected for the award for his work on the transuranium elements. The award was established in 1816 in honor of a Scottish chemist.

FEB 20 1953.

Award For Nobel Prize Chemist



For his work in manufacturing five elements, Dr. Glenn T. Seaborg (right), Nobel Prize winning chemist, receives the John Scott Award from Ernest T. Trigg, vice president of the Board of City Trusts of Philadelphia, at a Franklin Institute meeting of the American Chemical Society's city section.

**Dr. Seaborg Honored Here,
Foresees Seven New Elements**

By PIERRE C. FRALEY
Of The Bulletin Staff

Even though the next seven elements in the periodic table have not yet been discovered, their chemical properties already are known, Dr. Glenn T. Seaborg, Nobel Prize winning chemist, declared last night.

Scientists at the University of California, where Dr. Seaborg heads the radiation laboratory, are fully primed to identify the elements, numbered from 99 to 105, just as soon as they are manufactured by atomic fission or fusion.

Even if they are handed as little as a few hundred atoms of one of the elements, the scientists could be able to prove the existence of the new substances, he said.

Dr. Seaborg received the John Scott Award of the Board of City Trusts of Philadelphia at a meeting of the Philadelphia section of the American Chemical Society. The meeting was held at Franklin Institute.

Wins \$1,000

The award, consisting of a copper medal, a scroll and a check for \$1,000, was presented by Ernest T. Trigg, vice president of the Board of City Trusts.

Dr. Seaborg was honored for his work in manufacturing five elements, known as transuranium elements because they are heavier than uranium, element No. 92.

The citation stated that the discovery of the elements, which in-

cludes plutonium, the raw material of some atomic bombs, had a "most profound effect" upon mankind.

Dr. Seaborg said that a total of 45 isotopes of transuranium elements have been made. An isotope is an atom that chemically is exactly like all other atoms of the material but whose weight differs slightly.

Valuable Isotopes

Some of the isotopes are proving valuable in further research, he stated. This is especially true of certain isotopes of plutonium, element No. 94, and curium, element No. 96, which have a much longer half-life than other forms of the elements. The new isotopes, therefore, are easier to handle because the amount of radiation is less.

Besides plutonium and curium, Dr. Seaborg helped to make and discover americium, Berkelium and Californium, elements Nos. 95, 97 and 98, respectively.

The John Scott Award was set up in 1816 by a Scotsman who never came to Philadelphia or the United States. He left the city \$4,000 to be used to distribute prizes to persons who had made ingenious inventions or discoveries.

Among those who have received the award in the past were Madame Curie, Orville Wright, Marconi, Edison and another recent Nobel prize winner, Dr. Selman A. Waksman, co-discoverer of streptomycin.

Dr. J. W. E. Harrison, president of the Philadelphia section of the ACS, president at the meeting.

UC Chemist

Wins Award

Dr. Glenn T. Seaborg, noted University of California nuclear chemist, has today received the John Scott Award from the city of Philadelphia.

Dr. Seaborg, a Nobel Laureate and a professor of chemistry on the Berkeley campus, was selected for the award for his work on the transuranium elements, especially in the discovery of elements 94-98. The award includes a stipend of \$1000.

The award was made at a meeting last night of the Philadelphia Section of the American Chemical Society, which Dr. Seaborg addressed.

The award was established in 1816 in honor of John Scott, a chemist from Edinburgh, Scotland. It is presented to individuals adjudged to have made an outstanding contribution in the service of mankind.

Chemist wins Scott award

PACIFIC AL. 2/21/53
Glenn T. Seaborg, noted University nuclear chemist, has been awarded the John Scott award from the city of Philadelphia. He was named for his work on the trans-uranic elements and his discovery of elements 94 through 98.

Seaborg, a Nobel laureate and professor of chemistry here, was presented with the award at a meeting of the Philadelphia section of the American Chemical Society. The award includes a stipend of \$1000.

The award was established in 1816 in honor of John Scott, a chemist from Edinburgh, Scotland. It is given to individuals who have made outstanding contributions in the service of mankind.

OIL, PAINT & DRUG REPORTER
NEW YORK, N. Y.

FEB 23 1953

Scott Award Presented To Dr. Glenn Seaborg

Dr. Glenn T. Seaborg, director of chemical research at the radiation laboratory of the University of California and Nobel laureate, was presented with the John Scott medal award of the Board of City Trusts of Philadelphia February 19 at a meeting of the Philadelphia section of the American Chemical Society at the Franklin Institute, Philadelphia.

Dr. Seaborg was honored for his discovery and invention of five uranium elements — plutonium, americium, curium, berkelium and californium. Ernest T. Trigg, board vice-president, presented the award, consisting of an engraved copper medal and a premium of \$1,000. Dr. Seaborg won the Nobel prize in chemistry in 1951 jointly with his University of California colleague, Dr. Edwin T. McMillan, for their discoveries in the chemistry of the transuranium elements.

UNIV. BULL. 2/23/53
BERKELEY

Award for Seaborg

Glenn T. Seaborg, Professor of Chemistry, has received the John Scott Award from the City of Philadelphia.

Seaborg was selected for the award for his work on the trans-uranium elements, especially in the discovery of elements 94-98. The award includes a stipend of \$1,000.

The award was made at a meeting of the Philadelphia Section of the American Chemical Society, which Seaborg addressed.

The award was established in 1816 in honor of John Scott, a chemist from Edinburgh, Scotland. It is presented to individuals judged to have made an outstanding contribution in the service of mankind.

Section Activities

THE CATALYST 263

FEBRUARY MEETING

At the February meeting of the section, DR. GLENN T. SEABORG of the Radiation Laboratory of the University of California will receive the *John Scott Award* from the Board of Directors of City Trusts of Philadelphia in recognition of his "discovery and invention of the transuranium elements, Plutonium, Americium, Curium, Berkelium and Californium." The award will be presented by MR. ERNEST T. TRIGG, vice president of the Board of Directors of City Trusts of Philadelphia. Following the award ceremony the medalist will speak on "*PRESENT STATUS OF THE TRANSURANIUM ELEMENTS.*"



Dr. Seaborg, who was born in Ishpeming, Michigan in 1912, received the A.B. degree from the University of California at Los Angeles in 1934 and the Ph.D. degree in chemistry from the University of California at Berkeley in 1937 where he is presently professor of chemistry and

director of chemical research in the Radiation Laboratory of the University.

His main field of investigation has been nuclear chemistry and nuclear physics. He was on leave of absence from the University of California to the Metallurgical Laboratory of the University of Chicago from 1942 to 1946 where he was primarily responsible for the development of the chemical separation procedures which were used in connection with the manufacture of plutonium at Clinton, Tennessee, and Hanford, Washington.

At present Dr. Seaborg is engaged in research work at the University of California on the transuranium elements and on the identification of the various high energy nuclear reaction induced by the Berkeley 184 inch cyclotron. He directs the work of a group of graduate students in the field of nuclear chemistry and gives undergraduate and graduate lectures in this field.

Since 1936 Dr. Seaborg has published over 100 papers on the general subject of nuclear chemistry and nuclear physics, artificial radioactivity, transuranium elements, applications of artificial radioactivity to chemistry, etc. He is active in A.S.C. affairs and has received numerous other honors and awards in recognition of his many outstanding contributions.

In his talk, "*PRESENT STATUS OF THE TRANSURANIUM ELEMENTS.*" Dr. Seaborg will discuss the discovery and present status of these elements with emphasis on the latest investigations in this field. He will discuss the methods of production and availability of the presently known members of the series, their chemical and nuclear properties and how correlation of these properties has extended our understanding of radioactivity and made possible the prediction of the properties of elements and nuclear species as yet undiscovered.

Mining Journal

UPPER MICHIGAN'S LARGEST DAILY

SPORTS WEEK END PEACH FEATURES

★ ★ ★

Marquette, Mich. — Saturday, March 14, 1953

★ ★ ★

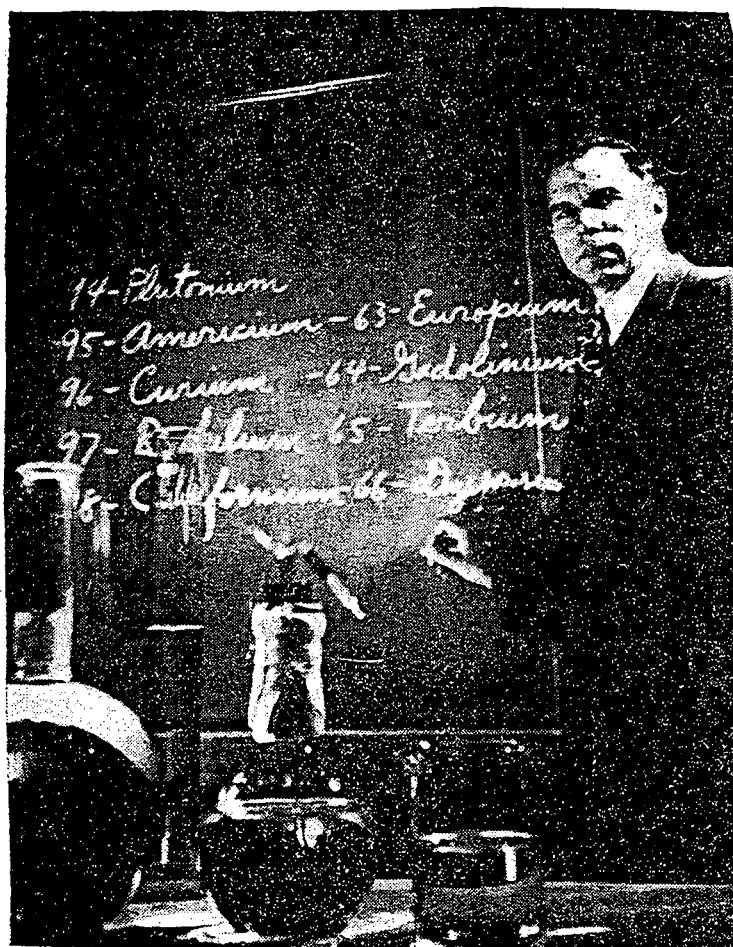
Seaborg's Contribution To Nuclear Science Told

Atomic Study Genius Native Of Ishpeming

BY JOHN D. VOELKER

Today at 40 he could play the part of Abe Lincoln without make-up. Like Lincoln, he is an authentic American genius. Like Lincoln, he is as modest as an old shoe. His accomplishments in the field of nuclear science are more fabulous than the wildest science-fiction flights of space ships and interplanetary rockets. He is today a Buck Rogers of the world of nuclear science. The scope of his research is timeless and spaceless: to discover the very guts of the universe itself; what force it is that makes the world tick. His name is Glenn T. Seaborg. Part of his story can now be told.

Up to 1940 there were 92 known elements arranged neatly according to their atomic weights. "Building blocks of nature," Seaborg has called them. Uranium was number 92, the heaviest of the known elements. Seaborg at the time was in chemistry at the University of California at Berkeley. A brilliant student, his first love was nuclear chemistry. For a long time he had suspected that there were other and heavier elements. Then early in 1940 came dramatic confirmation: two equally brilliant fellow scientists, McMillan and Abelson, discovered the first new "transuranium" element, neptunium, element number 93. Seaborg played a modest part in this research and the discovery fired his youthful imagination.



GENIUS IN THE CLASSROOM—Dr. Glenn T. Seaborg of the University of California faculty shown during lecture on transuranium elements on campus at Berkeley.

McMillan, a colleague of Seaborg's at Berkeley, then proceeded with experiments to determine if he could create suspected element 94 in the cyclotron at Berkeley. Before he could complete his research he was called away to war work. Would able young Seaborg take over the research? Seaborg, by this time as radioactive as the luminous dial of a five-dollar watch, leaped at the chance. There was then no plutonium (as element 94 was later dubbed) known to nature, but Seaborg concentrated on his research, employing some of the tiniest instruments and most novel techniques then known to micro-chemistry. Associated with him in this historic quest were Kennedy, Segre, McMillan and Wahl. They were attempting to discover and map scientific territory men weren't sure existed. The work went slowly. Then one day a light gleamed. Just a year before Pearl Harbor, significantly enough, young Seaborg and his associates finally tracked down and smoked out the new element number 94, Plutonium. The following spring they found its fissionable isotope, 239. Seaborg was able to isolate the new element only in invisible quantities measured in millionths of an ounce. Yet he and his colleagues utilized the amazing tracer techniques to determine the basic chemical properties of their new find. It was not unlike a paleontologist recreating some extinct monster on the basis of a sliver of jaw bone. It was only later that Seaborg's group was able to discover tiny amounts of plutonium in earthborne pitchblende and carnotite, two of the commonest uranium-bearing ores.

The War And Lodestar

Seaborg's startling laboratory creation and isolation of plutonium in its important fissionable form, 239, caused not a ripple outside a small closed portion of the world of science. Glum war news and a fast horse called Lodestar were sharing most of the newspaper headlines about then. Yet events were to prove it to be literally earth-shaking in its importance. For here at last was the theoretical "spark" for the atom bomb. To the anxious searching men of nuclear science it was at once apparent that Seaborg's discovery might not only sharply reduce the time needed to create atomic energy, but should also increase by a hundredfold the energy that could be obtained from a given quantity of uranium. An important link in the atomic chain had been forged. Then came Pearl Harbor.

During the fateful first week of December, 1941, a grim-faced group of distinguished scientists met in Washington to set up the Manhattan Project. This was the quest in earnest for the atom bomb. These men naturally knew of talented young Seaborg and the discovery

of plutonium. They knew, too, of the theoretical potentialities of his plutonium in the possible making of an atom bomb. But they were also aware that neither Seaborg nor any man had yet been able to produce plutonium in the fashion and in the quantities that would surely be needed in so vast an undertaking. The urgent problem was to find a rapid, large-scale method of producing plutonium from uranium. In the meantime, the Japanese were reeling up and down the Pacific, stunning the world with their oriental version of the blitzkrieg. The very survival of Western civilization seemed at stake.

It is now history that these mature and distinguished scientists, many of them Nobel prize winners, finally sought out the then 29-year-old chemist called Seaborg. Could

this fledgling scientist turn the trick? He thought he could. It was as simple as that. On this young man's quiet assurance the United States government proceeded to build the huge and expensive separation plants that would be needed. The "go" signal was given on the prayerful hope that young Glen Seaborg and his associates could effectively solve the separation process by the time the vast plants would be ready to operate. It was like building an elaborate series of fairy dream castles to house a bride one wasn't sure existed. It was a reckless plunge into the scientific unknown. But the stakes were high and the times were desperate. Surely rarely before in history had thoughtful men gambled so much on the genius of one man: **Science Wedded To Improvisation**

Glenn Seaborg sped to Chicago to direct the chemical separation processes. The world now knows that he and his associates—especially Stanley Thompson—turned the trick. The mass-production plutonium process was ready when the plants were built. It was a saga of pure scientific achievement wedded to plain homely Yankee improvisation. In due course the baleful light of the first atom bomb shined upon the face of the earth. An awed humanity had entered the dawn—or was it to be the twilight of a fateful era in the recorded history of men. . .

Shortly before his historic stay in Chicago, Seaborg, along with Gofman and Stoughton, somehow found time to discover the new fissionable isotope of uranium, U233, which opened wide the possibility for the use of the relatively plentiful element, thorium, as a nuclear fuel. (As known sources of that magic "pay dirt," uranium, become depleted and new stocks grow increasingly hard to find, the potential importance of this discovery cannot be too greatly stressed.) During the ferment of those



SCIENTIFIC AID—Dr. Seaborg poses with ion exchange column and attendant apparatus for successively placing the collecting tubes below the column. This is apparatus which was used for the identification of berkelium and californium and which shows up so well the analogy between rare earth elements and transuranium elements in the elution curves.

John Voelker Tells Story Of Scientist

EDITOR'S NOTE—The name of Dr. Glenn T. Seaborg, native of Ishpeming who became a Nobel award winning University of California nuclear scientist, is appearing with regularity in headlines of newspapers and magazines. Only last month, for instance, newspapers carried accounts of the presentation to Dr. Seaborg of the John Scott award by the City of Philadelphia. The award, which carries a stipend of \$1,000, was made to Dr. Seaborg in recognition of his work on the transuranium elements. The award was established in 1816 in honor of a Scottish chemist.

In order to give readers of this area a better understanding of Dr. Seaborg's background and achievements, The Mining Journal publishes the accompanying article, written especially for this newspaper by John D. Voelker, attorney and writer who resides in Ishpeming and is personally acquainted with Dr. Seaborg.

In a recent letter to Mr. Voelker, Dr. Seaborg made these interesting observations:

"In order to illustrate how big a place Ishpeming is you will be interested to know that one of my graduate students in nuclear chemistry, doing very well, is Peter R. Gray, born in Ishpeming and son of Bill Gray, who was a former city engineer. . . To further my thesis of Ishpeming's 'actual' size, I met the present city manager of Philadelphia, Robert K. 'Buck' Sawyer, in connection with the Scott award event, and found that he was in the grammar school class just one year ahead of me at Ishpeming."

frenzied war years Seaborg also found time, along with his associates, to discover two new elements: americium (95) and curium (96), together with significant radioactive isotopes of these elements. He even found time to fly back to Berkeley—this time without the support of his associates—there to woo and win the attractive secretary of a fellow scientist. In a thrice her name was changed from Helen Griggs to Mrs. Glenn T. Seaborg. Today they have four little isotopes of their own: Peter, Lynne, David and Stephen.

Since 1945 Seaborg has been a full professor of chemistry at Berkeley and director of chemical research in its world-famous Radiation Laboratory. He skipped the usual probationary pause as an associate professor, an heretical concession to his brilliance that is rare in staid academic circles. (The reason was that Chancellor Hutchins of the University of Chicago was trying to lure this "borrowed" scientists to stay on there, but California did not want to lose him.) Besides his teaching he has continued his exploration into the uncharted transuranium elements.

Ishpemingium Next?

The discovery of any one of these new elements would have been quite enough to insure the immortality of most scientists, but Seaborg, with the prodigality of genius, has since gone on to co-discover elements 97 and 98. (With him on this research was his old friend and high school classmate, Stanley Thompson, the same man who played such a decisive role in the development of the separation processes for plutonium.) These new elements have been tentatively given the names of berkelium and californium, doubtless for patriotic and sentimental reasons for guessing which the perceptive reader will be awarded a refrigerator and an all-expense trip to Bermuda. Seaborg has not only found these new elements but has mapped their chemical properties in great detail, a detail so thorough that more is known today about the chemistry of some of these synthetic elements than about their common cousins that occur in nature.

In Ishpeming a wistfully sentimental group of people hope that Seaborg will one day name one of his new elements ishpepingium. It would at least make quite a mouthful. Seaborg is the city's native genius: He was born here on April 19, 1912. His father, Theodore, was a machinist at one of the iron mines. His grandfather, John Eric, was an expert machinist here and in his native Sweden. Even his greatgrandfather was a machinist in Sweden before him. His uncle, Henry Seaborg, still teaches budding machinists in the Ishpeming

High School. One does not unduly labor the point, but perhaps the combination of rare chemical skill with the practical mechanical instinct inherited from his Swedish forbears has enabled this tall modest man to enlist the amazing micro-chemical skills that his laboratory possess today. "I'm not a micro-chemist myself," he has said. "but a couple of my men are the best in the world." To see the vision and then be able to capture it are ever present twin hurdles in the nuclear field. Seaborg has seen and captured.

Seaborg's 'Actinide Concept'

No public announcement has been made of the discovery of any transuranium elements beyond 98, but with what is now known, Seaborg and others have already postulated the existence and charted the chemical properties of transuranium elements as high as 118. This has been accomplished largely as the result of a Seaborg dream known as the "actinide concept." So esoteric is this concept that perhaps one had better just mention it and flee; any other course would be like a Cub Scout trying to explain Einstein's theory to his giggling den mates. In a word, Seaborg has envisaged a sort of vast universal pattern that has enabled him to predict the chemical properties of elements no man has ever yet seen or isolated. All elements past 92 are synthetic in the sense that they are not known to exist in appreciable quantities on earth and must be produced in the laboratory by artificial means from uranium, either directly or indirectly. The future problem in this field is largely one of starting materials, fleeting half-lives and all manner of tantalizing difficulties.

In recent years Seaborg has been inundated with scientific honors. He is honorary fellow of this and lecturer of that. His medals must now outweigh the man himself. He is beyond doubt the recognized leader in his field. One dubious honor so far been denied him: the Russians haven't yet claimed his discoveries. But one must not grow impatient. Up to 1951 perhaps his greatest honor was his appointment by President Truman to membership on the nine-man General Advisory Committee to the Atomic Energy Commission. In 1951 he achieved the scientists' Valhalla: he won the Nobel prize in chemistry. Few men have done that at 39.

One point must be made clear, as Seaborg himself would be the first to insist, that although he has figured dominantly in the dramatic discovery of five of the six new transuranium elements (the enormous importance of which isn't even yet entirely known), and also in the identification and determination of the nuclear properties of more than 100 isotopes throughout the periodic table, he did not do

it alone. Hollywood to the contrary notwithstanding, successful modern scientific research is not accomplished by lone, mad scientists crouching over smoking retorts and sizzling test tubes in secret laboratories; it is usually the result of the painstaking collaboration of many patient and dedicated people. But one thing is now pretty clear: this man who sparked the atom bomb is one of the solitary giants of a vast new area of human knowledge; he has already set himself apart as one of the great pioneers of science. This is conceded by the men who should know best: his colleagues in his own

field. If they say so, it must be true.

What does the man think of his work, especially his own large part in the first successful release of atomic energy? In an article called "The Atomic Age" appearing in the Swedish magazine *Industria* in 1948, Seaborg wrote as follows: "Although these fundamental discoveries came at such a time in the history of mankind that their first practical application was the release of atomic energy in the form of weapons, there is, fortunately, a much broader basis for this new branch of science. There is a vast potential area of peacetime applications which has not been, and in fact cannot yet be fully assessed. Only when we have more of that perspective which time and experiences alone afford, shall we be able to say with any assurance whether this new knowledge, on balance, more greatly serves mankind and the forces for good than it serves evil."

Today Seaborg is a tall, thin, loose-jointed, high-shouldered man of 40. As he strides across the campus at Berkeley, his shock of unruly dark hair surmounting his dark eyes and bushy black brows, the expression on his thin lined face is mainly one of quiet brooding. "The young Lincoln," one thinks involuntarily. He is known to be bending his great talents in nuclear chemistry and physics to solving the basic riddle of the forces that hold the nucleus of the atom together. In this soaring quest he has already made staggering progress. His research probes into the very plan and structure of the universe itself. No wonder the man broods. One can only speculate on the new elements he may be finding or the strange new nuclear fuels he may be discovering. At the same time one somehow finds it nice that he doesn't live in Moscow. In a future fraught at once with visions of unspeakable terror and grandeur it is solemnly reassuring to know that he is enlisting his genius on the side of all humanity — whether American or Russian, whether rich or poor, whether black or white.



NOBEL PRIZE WINNER—Dr. Glenn T. Seaborg, University of California chemist who was awarded the Nobel prize for discovering plutonium and four other elements.

NOBEL PRIZE WINNER CHARTER DINNER SPEAKER

All Riverside residents interested in development of the new College of Letters and Science on the Riverside campus of the University of California today were accorded the opportunity of sharing in the university's Charter Week celebrations.

Dr. Gordon S. Watkins, UCR provost, said today that the Charter banquet March 24, at which he will make a progress report on the new college, is open to all persons interested in the campus. Information concerning tickets may be obtained by phoning the provost's office, Riverside 1-3000.

Dr. Glenn T. Seaborg, Nobel prize-winning chemist who discovered plutonium and four other elements, will discuss the "Dawn of the Atomic Age" in the banquet's feature address.

Professor of chemistry and chemical engineering on the Berkeley campus, Dr. Seaborg was awarded

the Nobel prize in 1951 and was named "Chemist of the Year" in 1946, one of America's 10 outstanding young men in 1946 and "Alumnus of the Year" in 1948.

A graduate of UCLA, he earned his Ph.D. on the Berkeley campus. He is now faculty representative to the Pacific Coast conference.

Construction on the new campus is now nearing the half-way point. Classes are scheduled to begin Feb. 15, 1954.

UCLA Seats Dr. Allen as Chancellor

L.A. Times 2/1/53

Dr. Raymond B. Allen was inaugurated yesterday as the first chancellor at UCLA in solemn Charter Day ceremonies marking the university's 85th anniversary.

Filling Royce Hall Auditorium for the occasion were hundreds of students, alumni and cap-and-gowned representatives of 250 other universities and colleges in the United States and abroad.

Dr. Allen, who delivered the annual charter address, combining it with his acceptance of the chancellorship, dwelt with optimism on the "Prefectibility of Man."

Renaissance of Spirit

He described a renaissance of the human spirit where "we find the seeds of our greatest security as a nation and at the same time security for the dignity and freedom of the individual."

"If the individual can discover this for himself . . . he will learn that there are ways and means by which he can perfect himself," Dr. Allen continued. "He will demonstrate that man is perfectible."

Dr. Allen said the highest trust of education is to see to it that the atmosphere of learning is permeated with principle, human values and moral quality.

Found on Campus

"I have found such an atmosphere on this beautiful campus," he said. "I am honored and proud to have been called to work here to do my part in perpetuating the ideals of this great institution."

President Robert Gordon Sproul presented Dr. Allen in the Royce Hall Auditorium ceremonies. In an introductory speech President Sproul outlined the university's progress over the decades from a one-campus school of 40 students to the world's largest educational institution, with eight campuses.

Speeches of welcome for the chancellor were led off by Edward A. Dickson, chairman of the board of regents. Then followed Dr. Lee A. DuBridge, president of Caltech, representing visiting universities, colleges and learned societies.

Representatives Listed

Warren C. Crowell, president of the UCLA Alumni Association, represented alumni; Marshment if he refuses to co-operate, even under the protection of the Fifth Amendment."

Among the events of the evening were the presentation to Dr. Glenn Seaborg, winner of the Nobel prize in chemistry for his discovery of plutonium, of the Edward A. Dickson Achievement Award for the outstanding UCLA alumnus of 1952. The award was presented by Warren Crowell, president of the UCLA Alumni Association.

Crowell also officiated at the presentation to UCLA of the Arthur Cahill portrait in oils of Dickson, chairman of the university's board of regents, commemorating his 40 years of service on the board.

Seaborg Awarded John Scott Prize

Lafayette Sun 2/10/53

Dr. Glen T. Seaborg, 1154 Glen Road, Lafayette, Nobel Prize winner from the University of California, became the recipient of still another award in Philadelphia recently.

It was the John Scott Award, given to him by the Board of Directors of City Trusts of Philadelphia for his work on trans-uranium elements. Ernest T. Trigg, vice-president of the board, made the presentation before a meeting of the Philadelphia Section of the American Chemical Society on February 19.

The award was originally set up in 1816 in honor of a Scotch chemist and is made each year for outstanding contributions to the service of mankind. With the award Dr. Seaborg also received \$1000.

The

Annual Charter Banquet

Honoring the 85th Anniversary of the
University of California

Speakers: DR. GORDON S. WATKINS
Provost, Riverside Campus
"The Riverside Campus: Progress Report"

DR. GLENN T. SEABORG '34
Professor of Chemistry, Berkeley Campus
"Dawn of the Atomic Age"



When: Tuesday, March 24, 1953 7 p.m.
Where: Mission Inn, Riverside, California
How Much: \$2.75 per plate (tax and tip included)

All alumni of the University of California, their families and friends are invited. Reservations must be made by March 20.

DR. GLENN T. SEABORG '34 is one of the great pioneers of science. He has discovered and is continuing to explore an entirely new area of human knowledge. His discovery of plutonium made possible not only the more powerful atom bomb dropped on Nagasaki, but greatly multiplied the world's potential of nuclear fuel. For the work of his laboratory, which has uncovered five elements, Dr. Seaborg has been awarded the 1951 Nobel prize, has been named the "Chemist of the Year" in 1946, one of America's 10 outstanding young men in 1947 and "Alumnus of the Year in 1948." A graduate of the Los Angeles campus, he won his Ph.D. on the Berkeley campus. An avid sports fan, he is now the faculty representative to the Pacific Coast Conference.

Provost
University of California at Riverside
Riverside, California

Herewith \$_____ for _____ reservations for the Charter Banquet in
Riverside March 24.

Name_____

Address_____

Riverside campus speaker urges more science study

RIVERSIDE (UP) America's need today is for more scientists and more understanding of science by the man in the street, University of California nuclear physicist Dr. Glenn T. Seaborg said here last night.

Speaking at Charter Day ceremonies on the university's Riverside campus, Dr. Seaborg said students were shying away from scientific courses thus causing a "serious shortage" of scientists at the height of history's most

LA. Daily News 2/24/53
scientific age.

The UC atomic expert said, there will be only 40 per cent as many people receiving the bachelor's degree in chemistry in 1954 as received the same degree in 1950. In contrast, Russia estimated output of chemists will double during the same period.

Dr. Seaborg said that in a democratic society, the public needs a speaking acquaintance with science, if such a society is to make sound decisions.



At the Charter Banquet: Judge Gabbert, Dr. Seaborg, Dr. Watkins.

Plutonium Discoverer Warns That Ignorance is Dangerous

By JOHN HAGGERTY

The man who discovered plutonium, Dr. Glenn T. Seaborg, solemnly warned more than 300 alumni and friends of the University of California attending the annual Charter banquet at the Mission Inn last night that public ignorance of atomic power discoveries is dangerous.

Dr. Seaborg, whose discoveries in chemistry have made him world famed, stressed that "if the forces of atomic energy are to be mastered by our democratic society, they must first be publicly and intelligently discussed by our people."

As an example of current ignorance of atomic matters, the winner of the 1951 Nobel prize in chemistry cited a recent poll which showed that only 20 out

REVISOR'S DAILY NEWS 3/25/53

of every 100 Americans had even heard of the hydrogen bomb.

Fifteen per cent of those who had heard of the H-bomb had "absolutely no idea" of its destructive power, he added, asserting that "such information is essential to the operation of our democratic processes."

A professor of chemistry on the Berkeley campus of the University of California, Dr. Seaborg spoke on "The Dawn of the Atomic Age."

The first step in public education concerning atomic energy, he said, should be a review of what has been accomplished in the field, including—in the case of some key people—study of basic scientific principles involved.

Dr. Seaborg suggested the public might learn about atomic en-

ergy the way it learned about the automobile, the radio, and television: how to use them without understanding physical principles involved.

"Although the average American did not master the chemistry of the combustion of gasoline, he acquired an amazing practical know-how and general feel for its operation," he said.

And although hardly anyone but scientists understood the laws of electricity and magnetism, "an amazing number of people understood enough about radio to build simple receivers and actually experiment with this new medium," Dr. Seaborg noted.

The famed chemist admitted his analogy was not too accurate,

for "not everyone has atomic bombs or germ weapons or TNT bombs to play with."

Still, he said, people generally are acquainted with the use of such things as X-rays, and "with germs and medical drugs and with chemicals in almost all of our everyday actions."

He expressed confidence that "speaking acquaintance" with the potentialities of atomic energy will become widespread within a generation.

Dr. Seaborg noted an "alarming shortage" of qualified science teachers in the nation's high schools, and he said, "this is a problem we simply must do something to alleviate."

Linked with this is a falling-off of enrollment of science majors in American universities and colleges, he said, pointing out that only 40 per cent as many will receive the bachelor's degree in chemistry in 1954 as received that degree in 1950.

Meanwhile, he stressed, Russia indicates that it will double its output of chemists during the same interval.

Turning to the peacetime uses of atomic energy, the famed scientist said it "seems certain" that the average man will benefit from radioactive by-products before he will benefit from the use of atomic energy for fuel.

In fact, he said, "the greatest service to humanity in the long run will come from the use of these radioactive materials," their greatest benefit probably being their use in medical therapy and diagnosis and in biochemical and medical research.

"Formidable problems" face scientists trying to perfect a way of utilizing the enormous energy of the atom for power, Dr. Seaborg said.

He pointed out that one pound of fissionable material such as uranium or plutonium could provide enough energy to supply the power needs of a city like Riverside for a week.

Great difficulties are involved, however, in the slow-release of nuclear heat and its transformation into equivalent amounts of electrical energy, he said.

Staggering cost of putting atomic energy to work, he said, may keep the price of atomic power as high or higher than conventional fuels, but it will have "advantages which cannot be evaluated in terms of dollar values because there is no alternate way of accomplishing the same things at any price."

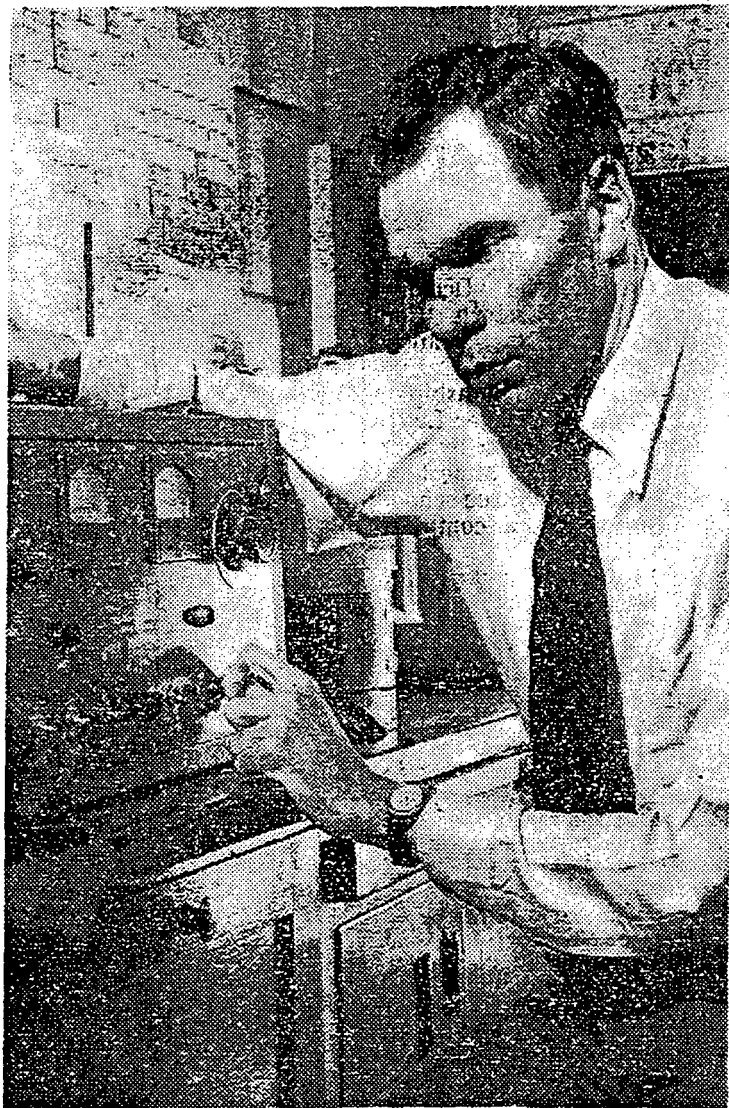
Dr. Seaborg was awarded the Edward A. Dickson achievement medal as the outstanding UCLA alumnus for 1952 at the Los Angeles Charter banquet last Friday.

He had previously been named "Chemist of the Year" in 1946, one of America's 10 outstanding young men in 1947, and Nobel laureate in 1951.

Superior Court Judge John G. Gabbert presided at the annual banquet honoring the 85th anniversary of the founding of the University of California.

The session also featured a progress report on the University's new College of Letters and Science now under construction near the Citrus Experiment Station.

Reviewing difficulties in obtaining structural steel, laboratory equipment and other materials, Dr. Gordon S. Watkins, University of California at Riverside provost, said first classes nevertheless will begin on schedule Feb. 15, 1954.



DR. GLENN T. SEABORG

Nobel Prize Winner To Address Club

Atom Scientist Hits Secrecy

By GEORGE RINGWALD

Dr. Glenn T. Seaborg, Nobel prize winner and discoverer of plutonium, last night reiterated his belief before members of the Riverside Present Day Club that the American public must be fully informed of the workings and potentialities of atomic energy.

He had said much the same in an address the previous night, at a University of California Charter banquet in the Mission Inn here.

But the famed chemist stated his viewpoint even more strongly last night at the session in the Riverside Woman's Clubhouse.

"There is a grave danger," he warned, "that we keep things secret that the Russians already know, and we don't inform our own people.

"We can afford to be liberal. The gain to our own people is much more than to the Russians; they find out what we're doing—it's an interesting datum—and then they go on and do it their own way anyhow."

In answering a question apparently in the minds of many Americans today, Dr. Seaborg said:

"In my opinion, the Russians are, unfortunately, technologically able to manufacture atomic bombs in quantity, and there is no question but that they have exploded atomic bombs."

He commented on the recent remark of former President Harry Truman that the Russians hadn't exploded any A-bombs by referring to it as "a very curious" statement.

"We can conjecture," Dr. Seaborg added, "that they're in production, and don't want to waste any fissionable material."

His explanation of why the Russians have exploded only a tenth as many bombs as the United States implied that the United States has a liberal supply of atomic bombs with which to experiment.

Dr. Seaborg, a professor of chemistry at the University of California at Berkeley, said the peacetime use of atomic energy in industrial power has many difficult problems to overcome before it will become a widespread reality.

These problems "will be solved," the 43-year-old scientist assured his audience, but he estimated it would be "a matter of decades" before the use would be widespread.

He pointed out that one very important peacetime use of atomic energy "is already with us."

"Today we can make almost any element radioactive by inserting it in an atomic pile, and it can be used for tracing."

Such tracers, which Dr. Seaborg evaluated as a much greater benefit to the average man than industrial power, are presently widely used in medicine—in diagnosing some circulatory disorders, in locating certain types of brain tumors and in curing or checking certain diseases.

During the past three years, said Dr. Seaborg, 20-25,000 shipments of radioactive isotopes have been sent out from the atomic stockpile at Oak Ridge, Tenn.

Radioactive tracers also have their uses in agriculture, in basic sciences and in industry, where they are used to measure thicknesses, the flow of liquids through pipes and to test the effects of friction on automobile pistons, for example.

Dr. Seaborg, awarded the Nobel prize in 1951 for expanding the sources of nuclear fuel and named the "Chemist of the Year" in 1946, was introduced to the Present Day Club audience last night by Dr. Gordon Watkins, provost of the University of California campus in Riverside.

EL RENO, OKLA.
TRIBUNE

MAR 29 1953

Scientists Say They Can Identify New Elements

PHILADELPHIA, Pa., March 28.—(U.P.)—Dr. Glenn T. Seaborg, Nobel Prize chemist, says scientists at the University of California are ready to identify the next seven new elements whenever they are "manufactured" by atomic fission or fusion.

Dr. Seaborg, head of the University's radiation laboratory, told the Philadelphia section of the American Chemical Society that the chemical properties of the next seven elements are already known and scientists can prove they exist, if given only a few hundred atoms of the new substances.

SCAN

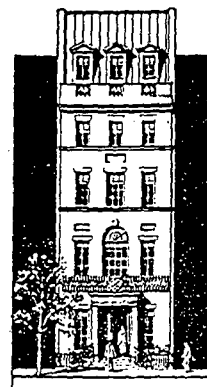
A MONTHLY BULLETIN

The American-Scandinavian Foundation

127 East 73rd Street • New York 21, N. Y. • TRafalgar 9-9779

MARCH, 1953

VOL. II, No. 3



GLENN T. SEABORG OF CALIFORNIA, NOBEL AWARD WINNER, DESCRIBES CEREMONY IN STOCKHOLM

Since my ancestry is completely Swedish, I have always been very interested in the Scandinavian countries. One of the greatest thrills of my life was the moment I first set foot on Swedish soil, and then came the exciting experience of becoming acquainted with relatives I had never seen before and visiting the home where my mother spent her childhood.

My second visit to Sweden was at the time of the Nobel award ceremonies in 1951. These ceremonies and all the events attendant are an unforgettable experience. When invited to be Member-of-the-Month, it immediately occurred to me that here was an opportunity to share this experience; perhaps some of the readers of SCAN who have not had the opportunity to witness this event would be interested in some of the details that are not so frequently emphasized.

One of the first things that strikes Americans as they enter the Konserthuset on December 10 is the formality of dress, much beyond anything to which we are accustomed — even the photographers are clad in white tie and tails. The Royal Academy is seated in tiers up on the stage, which is flower decked. Centered at the rear of the stage, is a decorative door, and directly over this is an imposing bust of Alfred Nobel surrounded by flowers.

The audience is prompt as the royal party most certainly will be prompt, and the audience must be in their places when the royal party enters. Their entrance is followed by that of the prize winners, this being the one occasion that the king is not the last to enter a room. This he does in special deference to the award winners, and he also actually hands the Nobel awards to the recipients, speaking to each one and shaking his

MEMBER-OF-THE-MONTH



Prof. Glenn T. Seaborg

hand.

One of the most pleasant memories of the ceremonies is the beautiful organ music.

The dinner following the Nobel ceremonies is held in the Stadshuset in the Gold Hall. This is a beautiful room done in gold as the name implies, and round the room are scenes depicting the whole of Sweden's history. Following the dinner there is dancing in the Blue Hall, which is not blue. This hall, with its tremendously high ceiling and marble balcony and stairway leading from the Gold Hall, was intended to be finished in blue tile. When the brickwork was completed, however, it was so beautiful and impressive that the hall was considered finished, but the name "Blue Hall" still persists.

It is my hope to return to Sweden before too many years for a more extended visit and to then become intimately acquainted with the whole of Scandinavia.

MARCEL COITROS
LEAVES

NOBEL PRIZE WINNER
CHARTER DAY SPEAKER

Dr. Glenn T. Seaborg, prize-winning chemist who discovered plutonium and



GLENN T. SEABORG

four other elements, will address the annual Charter banquet of the University of California in Riverside, March 24.

Considered one of the great pioneers of science for his work with nuclear fuels and radioactive isotopes, Dr. Seaborg will speak on "The

Dawn of the Atomic Age."

All alumni and friends of the University of California have been invited to the banquet by Provost Gordon S. Watkins of the Riverside campus, who is arranging the event. Commemorating the 85th anniversary of the statewide university, the banquet will be held in the Mission Inn.

In addition to the discovery of plutonium, which made possible the more powerful atom bomb dropped on Nagasaki, Dr. Seaborg has been responsible for finding the elements americium, curium, berkelium and californium.

For this work in expanding the world's sources of nuclear fuel, he was awarded the Nobel prize in 1951. He was named "Chemist of the Year" in 1946, one of America's "10 outstanding young men" in 1947, and "Alumnus of the Year" by the California Alumni association in 1948.



HANFORD, KINGS COUNTY, CALIFORNIA, TUESDAY, MAY 19, 1953

Noted Chemist Is Speaker



Nobel Prize-Winner

Public Must Be Informed On Science, Seaborg Says

One of the world's great chemists spoke in Hanford Monday night on the future of atomic energy.

Barely seven hours after he finished his talk here, he, and countless thousands of others in this area, were jolted out of their sleep by the latest blast of atomic fission some 400 miles distant.

Dr. Glenn Seaborg of the University of California, spoke realistically of the harnessing of atomic energy. He brought his subject down to the blunt details of what can be expected of science in controlling such energy for useful purposes.

Speaks at Chamber Dinner

The scientist's talk was delivered before 200 persons attending the annual Chamber of Commerce dinner.

Dr. Seaborg warned his listeners he felt it is "necessary for the American public to learn a great deal more about science and such matters than it knows today. If we are to solve the great problems

— we have to know a great deal more as to what it is all about."

Taking from his pocket a small cube, perhaps an inch square, Dr. Seaborg held it up before the crowd and remarked that if this represented one pound of uranium — and if all of it were to undergo fissionary action to be converted into plutonium—it would liberate energy equivalent to 2,000 tons of coal, or ten million kilowatt hours of energy.

Many Conversion Problems

The problems involved in effecting such a conversion are many, according to Dr. Seaborg, and to get an atomic pile, or nuclear reactor to provoke such a reaction poses formidable difficulties.

For one thing, atomic energy releases tremendous radioactivity and therefore shields must be used for protection. Thus, perhaps 100 tons of shielding, such materials, as concrete or lead, are needed for protection.

This would make use of atomic energy in running mobile vehicles

DR. GLENN SEABORG OF THE UNIVERSITY OF CALIFORNIA, a Nobel prize winner, gave the main address at the annual Chamber of Commerce dinner here Monday night.

Photo by Powell.

or automobiles virtually impossible. This is not true, however, of ocean-going vessels and atomic powered craft are under experimentation now. It also may work for airplanes.

Problems of Engineering

There are other great difficulties in obtaining fission for peaceful uses. Most of these problems are ones of engineering, and they are without precedent.

For example, what structural material would be used, since all ordinary materials won't work, as they absorb neutrons and thus kill the reaction.

There is the heat transfer problem—extracting the great amount of heat from a piece of material of tiny dimensions. Atomic energy is conversion of heat and it cannot be done by conventional methods.

Slow Heat Development

There is the problem of control itself, to develop heat slowly, as in a machine. "We must be careful to control it, so it is foolproof and will not go off as an atomic bomb."

There is the problem of chemical separation. In a sense, then, the ashes of the fire must be removed, too, because they accumulate. The question of waste disposal is a tremendous one, Dr. Seaborg asserted.

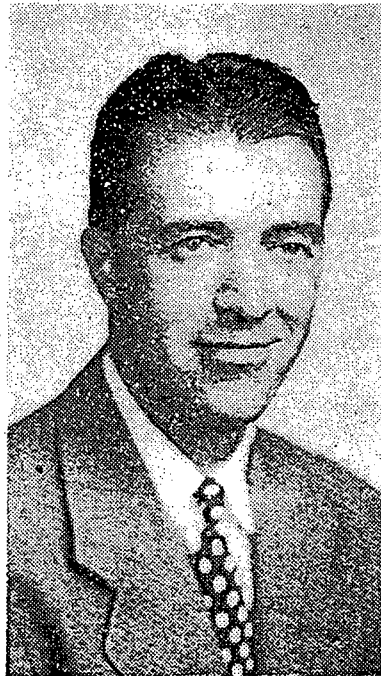
As to prospects for the future: The speaker said the consensus is that these problems will be solved—but not in the immediate future. Perhaps there will be large-scale plants to develop atomic energy, but it may be two decades before such power comes from fission and not from ordinary chemical sources.

Industrial Proposals Made

Proposals have been made by private industrial leaders whereby they might lease uranium from the government, convert it to plutonium and sell it back after developing the energy, according to Dr. Seaborg.

As to whether the economics of atomic energy, the chemist said he couldn't answer this question. "It might be possible it will — it depends upon the availability of the raw materials." No price can be put on it, he stated.

Dr. Seaborg then traced the possibilities in medicine and peacetime uses and its use in radioactive tracers, in science, agricul-



CLARENCE CHILDS
New President

ture, industry and other phases of life. He told of shipments of radioactive materials made to hospitals, laboratories and centers. He concluded that perhaps the greatest possibilities are in the field of medicine.

200 Scientists Gather; Atomic Expert to Speak

6/11/57
PULLMAN, WASH. HERALD
WSC men have a predominant part in the research-turned program as two hundred scientists gather this weekend from all Northwest states and British Columbia and Alaska. Occasion will be the sessions of the Pacific northwest region of the American Chemical society.

These gatherings will take place in Todd hall and Fulmer laboratory on the WSC campus, Friday, with an evening banquet slated for Compton union. Conference attendants will be staying in Pullman Friday night, but will move to Moscow to complete the two-day event Saturday in sessions in science hall, University of Idaho.

The interested public is being invited to hear one of America's most noted scientists who is to give the featured banquet address. He is Dr. Glenn T. Seaborg, Nobel prize winner from the University of California. His talk will start about 7:45 Friday evening in the Compton union ballroom. Special permission was received from the national ACS organization to open Dr. Seaborg's talk, since normally most ACS gatherings are closed, except to the membership.

Topic of Dr. Seaborg's address will be "The Present Status of the Transuranic Elements."

The Swedish Academy of Science in 1951 jointly awarded the Nobel prize to Dr. Seaborg and Professor Edwin M. McMillan, also of the University of California, for "their discoveries in the chemistry of the transuranium elements."

Professor Seaborg, who is in his early forties, was born in Ishpeming, Mich., and worked his way through college at UCLA.

Summer Session Changes

The following additional catalog changes for the Summer Session have been announced this week by Acting Director of the Summer Session David E. Willis.

1. Todd 102 has been scheduled for Mr. Kavanaugh's classes at 9, 10, and 11 daily.
2. Speech 475 will be limited in enrollment to ten students as facilities and the number of children in the clinic are limited.
3. Add Mr. Hofmeister, F. A. S526, Advanced Art History and Aesthetics, arrange.
4. Education S431 (S138), Science in the Elementary School. Change hour from 10 daily to 9 daily.
5. Education S200 (S60), Human Development and Education. Change hour from 10 daily to 7 daily.

Square Dance Festival

Frank and Carolyn Hamilton, noted California dance authorities, will supervise the annual Summer Session Square Dance Festival at the State College, June 24, 25, and 26. Mr. Hamilton is the author of the book, *Introduction to American Rounds*, and is on the editorial staff of *Sets in Order*, the square and round dance magazine.

The Institute will be held at the Women's Gymnasium, with the final session being a Square Dance Jamboree at the CUB, Friday, June 26, at 8:30 P.M. Admission is by Summer Session registration receipt or \$2.50 for the six sessions. Further information may be secured by contacting Professor Victor P. Dauer, Bohler Gymnasium.

Rural Sociology Bulletin

The Broken Home in Teenage Adjustments. A Study of 4,400 Rural and Urban Young People in Washington, by Professor Paul H. Landis, a bulletin of the Washington Agricultural Experiment Stations, Institute of Agricultural Sciences, is scheduled for publication in June. The bulletin is No. 4 of the Rural Sociology Series on the Family, and No. 9 of the Rural Sociology Series on Youth.

Chemical Society Holds Annual Regional Meeting on State College Campus Today

Notice . . .

From Dean of the Faculty

Legislative action on the 40-hour week has raised some question as to the applicability of the 40-hour week to the faculty. The legislation applied only to the Department of Public Institutions, which is one of the departments of state government. The State College of Washington has no connection with this department and is not affected by the legislation.

Field Days Scheduled

- Nine Agricultural Experiment Stations field days have been scheduled for this summer and will be held at the various stations throughout the state. The field days are open to the public and will be held at the following dates:
- June 17. Agronomy Field Day, Pullman
 - June 24. Dry Land Experiment Station, Lind
 - July 16. Northwestern Washington Experiment Station, Mount Vernon
 - July 21. Southwestern Washington Experiment Station, Vancouver
 - July 23. Western Washington Experiment Station, Puyallup
 - July 28. Tree Fruit Experiment Station, Wenatchee
 - August 14. Cranberry-Blueberry Experiment Station, Long Beach
 - August 19. Irrigation Experiment Station, Prosser
 - September 29. Animal Husbandry Feeders' Day, Pullman

Subsistence Allowance

The Office of the College Auditor desires to bring the following information to the attention of the College staff and faculty. The maximum total daily subsistence and lodging allowance authorized as of June 11, 1953, is \$9.00 in the states of Washington, Oregon, and Idaho, and \$12.00 elsewhere. Reimbursement will be made on the basis of actual allowable expenses within the above-stated limits.

An address by a Nobel Prize winner and the presentation of seventy research papers in chemistry will be the features of the annual Northwest Regional American Chemical Society meeting to be held on the State College campus, today, June 12, with additional sessions to be held on the University of Idaho campus in Moscow, tomorrow, June 13. Approximately 200 chemists from the Northwest (Washington, Oregon, Idaho, Montana, and British Columbia) are expected to attend the various sessions on chemical education, organic chemistry, physical-inorganic chemistry, molecular structure, analytical chemistry, biochemistry, and agricultural and engineering chemistry.

The principal address of the meeting will be delivered in the Compton Union Ballroom, Friday evening, at 7:45, by Glenn T. Seaborg, Professor of Chemistry at the University of California. The subject of the address will be "The Present Status of the Transuranic Elements," and the talk will be open to American Chemical Society members and the public.

Professor Seaborg was the recipient of the 1951 Nobel Prize in Chemistry, awarded by the Swedish Academy of Science, for his discoveries "in the chemistry of the transuranic elements." In addition, Professor Seaborg has received many other honors, including the ACS award in pure chemistry, the Nichols Medal, and the John Ericsson Gold Medal of the American Society of Swedish Engineers. He is a member of Sigma Xi, the American Physical Society, Phi Beta Kappa, Alpha Chi Sigma, Phi Lambda Upsilon, the National Academy of Sciences, the Royal Swedish Academy of Engineering Sciences, the American Institute of Chemists, and the Royal Society of Arts. He is also a member of the General Advisory Committee to the AEC.

Research Papers

The research papers will be presented at the divisional meetings today in Fulmer Laboratory and Todd Hall on

(Continued on page 2)

Oakland Tribune

ASSOCIATED PRESS...WIREPHOTO...WIDE WORLD...UNITED PRESS...CHICAGO DAILY NEWS FOREIGN SERVICE

OAKLAND, CALIFORNIA, WEDNESDAY, JUNE 17, 1953

U.C. Seniors on Last Fling Before Commencement

BERKELEY, June 17.—Commencement festivities were in full swing today at the University of California as the 1953 class counts the hours until graduation Friday.

President Robert Gordon Sproul, who will deliver the principal address to 6000 candidates for degrees and certificates

at the 90th commencement to be held at 2:30 p.m. on Edwards Field, will himself later play host to "old grads" of his class of 1913.

In the president's house on the campus immediately following graduation exercises, Dr. and Mrs. Sproul will hold a reception for 150 classmates celebrating

the 40th anniversary of their own commencement.

The 1913 graduates will join with approximately 1500 sons and daughters of California at the annual alumni luncheon in Faculty Glade preceding commencement. They will hear Col. Katherine Towle, retired director of the Women's Marine Corps,

speak on "The Return of a Native" as she prepares to assume Campus duties of dean of women and associate dean of students, on July 1.

Representing graduating seniors will be David Grant and Marilyn Schade, class president and vice-president, respectively; Richard Holler and Margie

Coombs, president and vice-president of the ASUC.

The class of 1903, celebrating the 50th anniversary of its graduation, will have as spokesman Robert Sibley, former executive manager of the Alumni Association.

This year, for the first time, Chancellor Clark Kerr will voice the farewell to retiring faculty members—a role for many years of Dr. Monroe Deutsch, retired provost. President Sproul will

also greet alumni at the traditional box luncheon in the glade.

Tonight men and women of the senior class will hold separate banquets at the Hotel Claremont—merging later for a dance. Co-eds will hear Mrs. Robert W. Long, president of the Bay area chapter, American association of University Women, and Chancellor Kerr.

At the men's banquet Dr. Glenn T. Seaborg, Nobel prize-winning professor of physics,

will present the Jake Gimbel award to the graduating senior making the biggest contribution in sports.

From 1 p.m. to midnight tomorrow, seniors will hold a barbecue at Turtle Rock Ranch near Walnut Creek. On Friday, starting at 10:30 a.m., they'll march in farewell pilgrimage to campus landmarks. Then comes commencement and that night the senior ball at Hotel St. Francis, San Francisco.

He added his Ph. D. from the Berkeley campus and in 1939 became an instructor at California. He came back from leave at the Metallurgical laboratory in 1946 as full professor and began to direct chemical research in the university's radiation laboratory.

Dr. Seaborg is chairman of the division of physical and inorganic chemistry for ACS. In addition to the Nobel prize his awards include the ACS award in pure chemistry, the Nicholas medal, and the John Ericsson gold medal of the American Society of Swedish Engineers.

In 1944 before the discovery of americium, Dr. Seaborg and R. A. James and A. Ghiorso combined to identify the fourth transuranium element. In 1940 element 94 was discovered as a result of the work of Dr. Seaborg and A. C. Wahl and J. W. Kennedy. Since then, the California savant and co-workers have added six new synthetic elements (93 up through 98).

There are 70 papers, all representing research, on the full program of the sessions in Pullman and Moscow. Eighteen of these reports are by State college people. WSC staff and student representation includes: J. H. Wagner, H. W. Dodgen, James W. Cleary, Allen I. White, Gail Stapleton, R. E. Anderson, J. L. Culbertson, O. M. Gardner, C. H. McCormack, E. L. Wegner, G. D. Wagner, Jr., Noel Elliott, R. P. Gigger, Carl M. Stevens, Pran Vohra, Harold L. Rice, Laurence D. Starr, Robert J. Brotherton, Stewart E. Hazlet, Edward Inamine, Oliver A. Roholt, John M. Lawrence, Kermit Groves, E. O. Sinkover, Grant Gill Smith, Donald G. Ott. Others from WSC's Western Washington experiment station will also be represented.

Representation from elsewhere includes: G. E. works at Hanford; University of Texas; Seattle university; College of Puget Sound, Tacoma; Oregon State college; Idaho State college; University of Idaho; Hooker electrochemical; University of Washington; University of British Columbia; University of Alaska; Reed college; University of Oregon; Gonzaga university; Oregon Medical school, Portland.

Dr. Harold W. Dodgen of WSC is program chairman, with Professor Harry Cole, arrangements chairman. Dr. Harry J. Batey, Jr., is publicity chairman.

Entertainment is planned for wives and families. There is to be a luncheon Friday at the Culbertson home at 415 Dexter, with Mrs. H. Bayard Milne in charge of arrangements.

WATTS NEWS-PRESS

—Published in connection with the SOUTHEAST NEWS-PRESS and FIRESTONE PARK NEWS — NED REDDING PUBLICATIONS

VOLUME 2, NUMBER 24

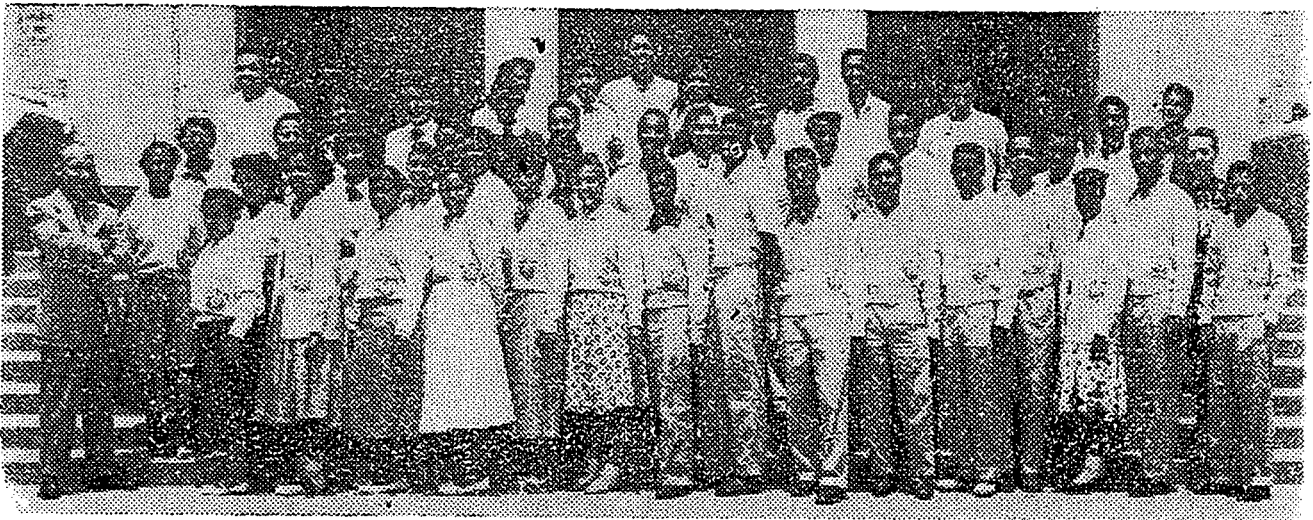
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8717 COMPTON AVENUE

JORDAN GRADUATES HONORED BY

THURSDAY, JUNE 18, 1953

FAMED SCIENTIST



JORDAN'S S'53 ARISTOTELIAN CLASS

Nobel Prize Winner Speaks To Jordan Graduating Class

Graduation exercises for the Jordan High School Aristotelian Class of S '53 will feature Nobel Prize winner Dr. Glenn T. Seaborg as guest speaker. The exercises will be held tomorrow night at 8 o'clock in the Jordan auditorium.

Dr. Seaborg, co-discoverer of the element plutonium and a professor at the University of California at Berkeley, is making the trip from Berkeley solely for the purpose of speaking at his alma mater's graduation services.

Annie Jones and Peggy Shannon are Ephebian of the Aristotelian Class, the former also being a sealbearer award winner and the latter the faculty scholarship cup winner.

Claudine Hays is being honored by the music department, while Alyce Bolden is the recipient of the business education award. Odean Anderson claims a similar honor in the mathematics department. The science award goes to Shannon, as does the honor of "Top Girl."

American Legion winners are Jerome Wright and Corean Whitehead. The Charles E. Hicks Knight Award goes to Frank Weaver.

Members of the graduating class include:

BOYS

Louis Lavaurn Ashley, Billy Bernard Ausbrooks, Lewie Bedolla, Printess Bolden, William Caraway, Tony Castaneda, Harvey Gene Clark, LaRoyal Colline, Casey Earl Conner, Henry Ray Cravin, Ezell Cornwall, Warner Eugene Davis, Roy Lee Dickson, Frank Daniel Ellington, Eli Bolden, Catherine Boykin, Dorothy Brown, Ysaura Colacion, Ella Mae Davis, Gertha Renae Joseph Fulsom, Anthony Grace, James Gamble, John Gordon, Willie Graham, Charles Negrete, Jr., Johnnie Hamilton, L. J. Harper, Robert Hill, Eulas Hood, Lionel Joseph Patin;

Barron Parks, David D. Ramos, Jr., Linwood Reeves, Robert Rhyne, Carlos David Rivera, Charles Robinson, John Segura, Robert Lee Simpson, Stephen B. Simms, Prince Alfred Shaw, Jr., Otis Calvin Thymes, Frank Weaver, Sherman Williams, Emmett Leonard Woodard, Jr., Jerome Wendell Wright, Harold Eugene Young.

GIRLS

Sadie Alexander, Odean Anderson, Doris Rose Bailey, Rochelle Benson, Alyce Dolores Davis, Ria Elizabeth Evans, Arnetta Marlene Finney, Evelyn G. Flores, Nila Jewel Gibson, Gloria Godfrey, Ernestine L. Gonzales, LaVerne Marie Gray, Barbara Ann Griffin, Claudine Hays, Julia Jamerson, Mamie Louise Johnson, Annie Louise Jones, Bernice Lambert, Delfina G. Naldonado, Gwendolyn Yvonne Rideau, June Laverne Rogers;

Lupe Romero, Barbara Nell Ross, Margaret Ann Sanders, Peggy Jean Shannon, Myrtle Louise Sneed, Jeanett Story, Genevieve Villegas, Eva Genell Washington, Dorothy Jeanne Whiten, Corean Whitehead, Janice Lee Wicks, and Jean E. Williams.

10/14/53

Glenn Seaborg

Speaking at the October 13th Collection, Nobel Prize winner Glenn T. Seaborg, nuclear chemist and physicist, will explore some aspects of a field greatly indebted to his own research and discovery. Among the American scientists responsible for the execution of the atomic bomb, this modest and keen-witted professor at the University of California is the discoverer or co-discoverer of plutonium, americium, curium, berkelium and californium; he is also a noted leader in the fields of neutron reactions, radio-active isotopes, and the transuranium elements: the late Dr. Gilbert N. Lewis, dean of the College of Chemistry at Berkeley, termed him "one of the greatest scientific geniuses of our time."

Dr. Seaborg was born April 19, 1912, in Ishpeming, Michigan, into a family newly arrived from Sweden. During his youth, he earned money at odd jobs until his graduation from David Starr Jordan High School, where he was valedictorian of his class. He then worked as laboratory assistant for the Firestone Tire and Rubber Company for a duration of time, until finally enrolling at U. C. L. A. There, among other activities, he was for two years president of Kappa Gamma Epsilon fraternity, and was elected to Sigma Xi and Phi Beta Kappa.

Upon graduation, Dr. Seaborg was chosen by Dr. Lewis to be a research associate and assistant at the College of Chemistry at Berkeley; Dr. Lewis and he collaborated on several field articles and, so successful were Dr. Seaborg's experiments, he was eventually given the title of Instructor.

From 1946 to 1950, Glenn Seaborg served on the General Advisory Committee for the Atomic Energy Commission. He belongs to the Committee on Radioactive Constants of the International Union of Chemists; is a fellow of the American Physics Society; belongs to the American Chemical Society, the American Philosophical Society, and was

elected to Ohio State University. In 1947, he won the award in Pure Chemistry from the American Chemical Society; he also holds the William H. Nichols Medal of 1948, the John Ericsson Gold Medal, from the American Society of Swedish Engineers, and, in 1951, won the Nobel Prize with E. M. MacMillan.

Perhaps the most celebrated contribution Dr. Seaborg has made to date has been the discovery of Plutonium, the ninety-fourth element. At a time when other atomic scientists were satisfied with uranium, Dr. Seaborg's experimentation led him to the new element; *Current Biography 1948* describes the intricacy of the procedure: "When the work began, it was not known whether either attempt was going to be successful since the chemists were actually working with an amount of plutonium so small that it could not be seen. By means of tracer chemistry, whereby invisible amounts of radioactive elements can be followed through their chemical reactions by instruments such as the Geiger counter, however, a beginning toward the understanding of the element's properties was made.

"The manufacture of plutonium by the cyclotron method was started at the same time. On September 10, 1942, the first fraction of a gram of pure plutonium compound was isolated and weighed, thus facilitating the study of plutonium by the method of ultramicrochemistry, described as ordinary chemistry evenly scaled down in all its parts."

Today, still at the University of California, Dr. Seaborg is Professor of Chemistry, shoots a ninety game of golf, and is well-liked by his fellow-scientists. The man who extended the table of elements to number 98 busies himself with landscaping his new home.

W. M. P.



Journal and Courier, Lafayette, Ind.
DR. GLENN T. SEABORG of the University of California, one of the nation's top scientists in the atomic energy field, was scheduled to give an open and admission free lecture at 8 o'clock Friday night in the Purdue Hall of Music. His subject was listed as "Radioactivity and Man - Made Elements," in a popular rather than technical vein. As discoverer of plutonium, Dr. Seaborg was a key figure in the atomic bomb project. 10/16/53

Philadelphia Cal. Mthly. 12/53

The general chairman for the gala Penn week end was Eugene "Jed" Baker '40. About 50 alumni from the Philadelphia environs attended a luncheon at the Warwick hotel Friday, October 9. They heard speakers Glenn T. Seaborg, Ph.D. '37; Brutus Hamilton and Dr. Brick Muller '24. Other University and athletic department officials were also honored.

That night, a group of about 100 met for dinner at the Warwick, where the featured speaker was President Robert Gordon Sproul.

A pre-game luncheon and rally started off Saturday's festivities. More than 250 displaced Cal rooters crowded into Houston Hall on the Penn campus. Among the honored guests were Herman Phleger '12, legal advisor to the state department; and Allen Sproul, brother of the president, who is president of the Federal Reserve bank of New York. U.S. Chief Justice Earl Warren '12 also occupied an honored spot at the luncheon, the game, and the post-game rally and reception at the Warwick.

At the game itself, Varsity vell leader Bill Bell, aided by Ed "Red" Drew '21, led the cheers of a Cal rooting section of well over 1000. Drew, still rubber-armed, gave his own inimitable "Oski."

After the game, the rooters retired en masse to the post-game reception to hear speeches by Chief Justice Warren, Warren Olney, Phleger, Hamilton and Waldorf.

Noted Atomic Scientist to Give All-College Lecture Wednesday

Winner of Nobel Chemistry Prize Guest Speaker

Santa Barbara paper 11/10/54

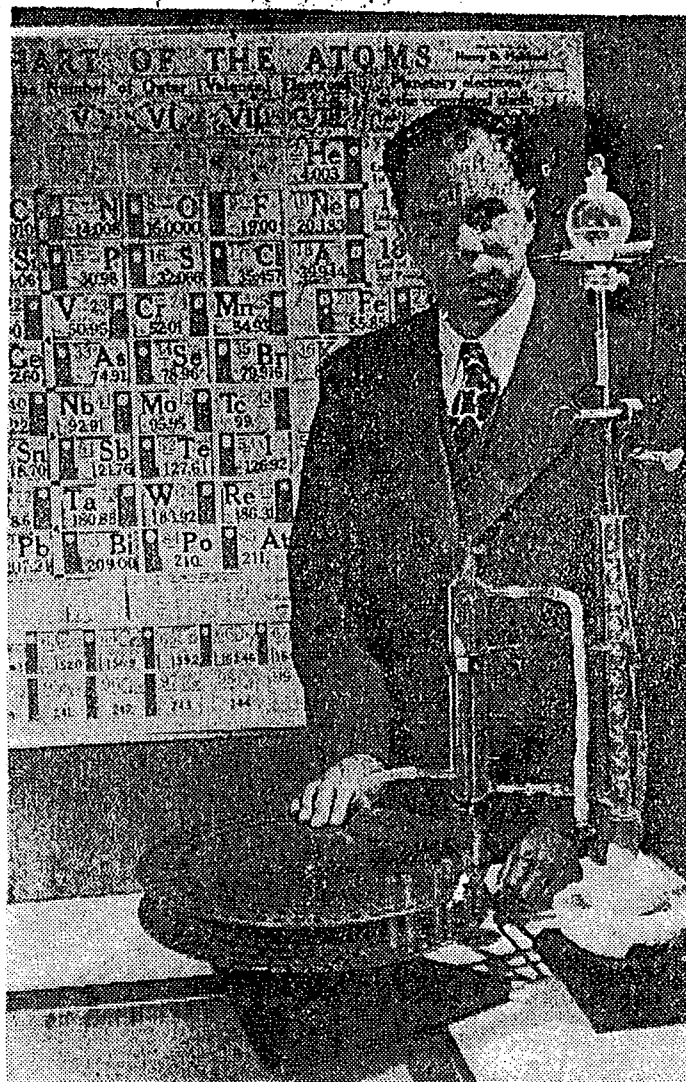
Dr. Glenn T. Seaborg, one of the world's leading atomic scientists and winner of the Nobel Prize in Chemistry in 1951, will be the guest speaker on the All-College Lecture event for Wednesday at 4 p.m. in the Santa Barbara College Riviera campus auditorium. The lecture is free and open to the public.

His discoveries have played a vital part in the 14-year-old atomic age, and through imaginative research overcame the mountainous problems which faced nuclear scientists before World War II. Among the accomplishments is his outstanding record as co-discoverer of the new element, plutonium, which was to become the first synthetic element ever seen.

Real Importance

The importance of the plutonium discovery became apparent when it was found that one of the isotopes of the element was fissionable. He and his group were also responsible for the discovery of the other atomic energy uranium isotope, U-233. These discoveries were made at the laboratories of the University of California at Berkeley, in the early 40s.

The story of Dr. Seaborg's scientific career, in which he challenged and solved scores of problems relating to nuclear science, is as fabulous as the development of the atomic bomb itself.



DR. GLENN T. SEABORG, professor of chemistry, University of California, shown on lecture platform. In the background is periodic table of elements, of which he discovered a number. In right foreground is essential apparatus Seaborg uses for separation of new elements.

Born in Michigan of Swedish ancestry, his family moved to California when he was 10 and settled in South Gate. He attended Jordan High School and found his first interest in chemistry and physics.

Always Independent

Throughout his youth he was resourceful and independent and always earned his own spending money in a variety of odd jobs, including an apprenticeship on the linotype for the old Los Angeles Herald.

He began his college career at UCLA, obtained a job in the chemistry laboratory and held a heavy assistantship schedule. During his undergraduate years at UCLA, nuclear physics and chemistry captured his imagination and he concluded that he would pursue this particular field. During his junior year he was elected to Phi Beta Kappa.

Joined Faculty

Dr. Seaborg joined the University of California faculty as an instructor in 1939 and in 1941 was promoted to the rank of assistant professor. During this period he and his associates discovered several dozen isotopes and published 40 scientific papers.

The fruit of their labors culminated in the discovery of a plutonium in 1940 with its fissionable isotope. This meant that it could be used as a source of atomic power, although plutonium would have to be produced in sufficient quantity and the chemists

would have to learn the chemistry of the new element and find out how to separate it from uranium and the fission

products. The discovery of the isotope U-233 from uranium also came at this time.

The famed Manhattan Project, which was begun early in the war, decided the plutonium work should be undertaken at the University of Chicago Metallurgical Laboratory. Granted Leave

Dr. Seaborg was granted a leave of absence from the University of California to take the job as chief of the section to work out the complete chemical process for the separation at Oak Ridge, Tenn., and Hanford, Wash., of the plutonium and intensely radioactive fission products.

Two More Elements

During his work in Chicago, he and his associates discovered two more elements, americium (element 95) and curium (element 96). He returned to the University of California in 1946 as a full professor to assume the responsibility for the direction of the chemical research in the radiation laboratory of the university. He is presently engaged in research work at Berkeley on the trans-uranium elements and on the identification of various nuclear reactions induced as a result of the operation of the 184-inch cyclotron. In this post-war research Dr. Seaborg and his colleagues have discovered berkelium (element 97), and californium (element 98).

LEADING ATOMIC SCIENTIST SPEAKS TODAY IN LAST OF LECTURE SERIES; KAYWOOD SPOKE LAST WEDNESDAY

*by Beth and Sylvia Klasson,
Santa Barbara, El Gaucho*
One of the world's leading atomic scientists and winner of the Nobel Prize in chemistry in 1951, Dr. Glenn T. Seaborg, will be the speaker at the last in the series of All-College Lectures this afternoon at 4 pm in the Riviera auditorium.

Now a professor of chemistry and chemical engineering at the University of California Radiation Laboratory at Berkeley, Dr. Seaborg, while on leave from UC, supervised the famed Manhattan Project scientific team at the University of Chicago Metallurgical Laboratory during World War II, responsible for the miraculous solution of the chemical processes involved in producing the atomic bomb. Under his direction, the process was designed and actually put into operation for the first atomic bombs in a little over three years.

Impressive Record

Dr. Seaborg's record of scientific discoveries and accomplishments contributing to the nuclear age is unbelievably impressive. He is the co-discoverer of plutonium, which became the first synthetic element ever to be seen, and of the fissionable isotope of plutonium; the new fissionable isotope uranium, U-233; berkelium, element 97; and californium, element 98.

Non-Technical Lecture

In a non-technical talk this afternoon, Dr. Seaborg will not only tell of the events leading up to the present knowledge of atomic energy, but will also point out problems to be solved and will dwell on its peacetime application.

Education Talk

Last Wednesday's speaker, was Dr. Richard Kaywood, assistant professor of physical education, who discussed "College and Community, Partners in Education."

Dr. Kaywood stated that college-community cooperation can play an important part in the preparation of college graduates as responsible individuals and citizens. He expressed the belief that closer working relationships between the college and the town can help solve the serious shortcomings of leisure-time activities.

Physical-Recreational

He explained that surveys show American adults in general, and college graduates in particular,



DR. GLENN T. SEABORG

have not learned necessary physical-recreational skills, or that they have not been able to relate skills learned at school and college to recreation after graduation.

The speaker's recommendation for a solution to this problem was the incorporation of community resources into the college physical education program to a certain extent.

Town, College Cooperation

Dr. Kaywood described various types of college-community cooperation, including activities in participation in welfare problems, field trips showing the practical application of the various sciences and activities concerned with citizenship and political science.

"If this cooperation really advances educational objectives, it should become an integral part of the curriculum, with the community resources deliberately and judiciously integrated into the regular program to their maximum potential," he stated. "Development of this vital aspect of higher education must not be left to chance."



SEABORG



Nobel Winner To Give Talk

LAFAYETTE — Dr. Glenn T. Seaborg, Nobel Prize winner and resident of this community, will make one of his rare public appearances Monday night at a meeting of the Acalanes Parents Club, in the school gym at 8 o'clock.

He will discuss "Science as a Career for Young People."

Dr. Seaborg, now a professor of chemistry at the University of California, is co-discoverer of a number of radioactive isotopes.

DISCOVERED PLUTONIUM

He and his co-workers discovered plutonium while doing research work at UC between 1936 and 1942. The discovery's great importance became apparent when it was found that one of the element's isotopes was fissionable and a source of atomic power.

Also on the program will be exhibits of students' work in the Acalanes science courses and a demonstration of class projects led by advanced science students.

In charge of the program are Department Chairman Margaret Nicholson and Teachers Barbara Cross, John Annis, James Nelson and Alex Winchester.

Monday night's meeting is open to Parents' Club members and Acalanes students who are interested in science, according to Mrs. Donald Krotz, president.

Dr. Seaborg also played a part in discovery of americium, curium and a new fissionable isotope of uranium.

In 1942 he went to the University of Chicago metallurgical laboratory to supervise a team working on a plutonium project for the government.

He is a past and present officer in many professional organizations and is a member of the Royal Swedish Academy of Science.

FOUR CHILDREN

Married, he has four pre-school age children.

Also on the program will be demonstrations of class projects by several advanced science students under the direction of Margaret Nicholson, department chairman, and Barbara Cross, John Annis, James Nelson and Alex Winchester, teachers.

Victor T. Johnson is program chairman. Mrs. Donald Krotz, club president, will conduct the meeting.

Nobel Winner To Address Club

LAFAYETTE, Jan. 14. — Dr. Glenn T. Seaborg, co-winner of a Nobel Prize, will address the Acalanes Parents' Club during its Science in Action program at 8 p.m. Monday in the High School gymnasium.

Dr. Seaborg, a chemistry professor at University of California, will discuss "Science as a Career for Young People," according to Victor T. Johnson, program chairman.

Dr. Seaborg won the coveted Nobel award in 1951 for his work in chemistry. He directed research in the discovery of plutonium and the creation of the atom bomb.

A 1934 graduate of University of California, Dr. Seaborg participated in the discovery of the fissionable isotope of uranium and of americium and curium. In 1942 he was commissioned by the U.S. Government to head work on the plutonium project at the University of Chicago Metallurgical Laboratory.

The 40-year-old scientist, his wife and their four children reside here.

Oakland Tribune 1/14/54

Walnut Kennel

11/15/54

Nobel Prize Winner Seaborg To Speak at Acalanes H.S.

The man who led research toward discovery of plutonium and creation of the atom bomb, Dr. Glenn T. Seaborg, will speak at Monday night's meeting of the Acalanes Parents club, 8 p.m., in the gymnasium.

Dr. Seaborg, co-winner of Nobel prize in chemistry in 1951 for this work, will discuss "Science as a Career for Young People," at the Parents' club program on Science in Action.

Members of the club and Acalanes students who are interested in science have been invited to hear Dr. Seaborg's unprecedented talk, according to Victor T. Johnson, program chairman. The Nobel prize winner makes few public appearances, and has made no others at schools, but is speaking at Acalanes as a service to his community. He is a resident of Lafayette, and has four pre-school children, Peter 5, Lynne 4, David 2, and Stephen, 3 months.

Exhibits of students' work in Acalanes science courses will be part of the program, designed to show objectives of the study course. Several advanced science students will demonstrate class projects. In charge will be Margaret Nicholson, department chairman, and teachers Barbara Cross, John Annis, James Nelson and Alex Winchester.

A 1934 graduate of the University of California, Dr. Seaborg is now a professor in its chemistry department. His main field of investigation has been nuclear chemistry and nuclear physics. He was co-director of a number of artificial radioactive isotopes of elements throughout the periodic sys-

tem during the period 1936 — 1942 at the university.

His group of research workers discovered plutonium during this period, and its importance became apparent when it was found that one of the element's isotopes was fissionable, and it could be used as a source of atomic power.

He was co-discoverer in 1942 of the new fissionable isotope of uranium, and in 1944 of americium and curium in investigations involving the Berkeley cyclotron.

He was called by the government to Chicago in 1942 to work on the plutonium project at the University of Chicago metallurgical laboratory, and brought with him a group of even younger U.C. associates. They formed the nucleus of a 100-man "plutonium team" under Dr. Seaborg's supervision.

With his wife, the former Helen Griggs, Dr. Seaborg has become part of the Lafayette community of patio-building, gardening homeowners, and has as his other hobby away from the laboratory, playing golf. His favorite spectator sport is football.

World-known, his honors include inclusion in the "10 outstanding young men of 1947," as well as membership in many scientific groups, many of which he heads or has headed. He has been awarded medals in this country and others, is a foreign member of the Royal Swedish Academy of Sciences, among others.

He will make one other public appearance this spring at the Science Fair in San Francisco in April.

Presiding at Monday night's meeting will be Mrs. Donald Krotz, Parents' club president.

Lafayette Sun

11/15/54

Nobel Prize Winner from Lafayette to Speak at Acalanes Parents Club Meet

The man who led research toward discovery of plutonium and creation of the atom bomb, Dr. Glenn T. Seaborg, will speak at Monday night's meeting of the Acalanes Parents Club at 8 p.m. in the school gymnasium.

Dr. Seaborg, co-winner of the Nobel Prize in Chemistry in 1951, will discuss "Science as a Career for Young People," at the Parents Club program on Science in Action.

Members of the Parents Club and Acalanes students who are interested in science have been invited to hear Dr. Seaborg's talk, according to Victor T. Johnson, program chairman.

THE NOBEL PRIZE winner makes few public appearances, and has made no others at schools, but is speaking at Acalanes as a service to his community. He is a resident of Lafayette, and has four pre-school children, Peter, 5, Lynne, 4, David, 2, and Stephen, 3 months.

Exhibits of students' work in the Acalanes science courses will be part of the program, designed to show objectives of the study course. Several advanced science students will demonstrate class projects.

In charge will be Margaret Nicholson, department chairman, and Teachers Barbara Cross, John Annis, James Nelson and Alex Winchester.

A 1934 graduate of the University of California, Dr. Seaborg is now a professor in the chemistry department. His main field of investigation has been nuclear chemistry and nuclear physics.

His group of research workers discovered plutonium, and its importance became apparent when it was found that one of the element's isotopes was fissionable, and it could be used as a source of atomic power.

WITH HIS WIFE, the former Helen Griggs, Dr. Seaborg has become part of the Lafayette community of patio-building, gardening homeowners, and has as his other hobby away from the laboratory, playing golf. His favorite spectator sport is football.

Oakland Tribune 1/19/54
U.S. Faces Shortage of Scientists, Seaborg Says

LAFAYETTE, Jan. 19.—America suffers from a serious shortage of scientists, Dr. Glenn T. Seaborg, University of California Nobel Prize winner, told the Acalanes High School Parents Club here last night.

He said only about 40 per cent as many bachelor's degrees in chemistry will be awarded this year as were received in 1950.

"Contrast this with the best available information from Russia which suggests that their output of chemists will double during the same interval of time," he said.

Dr. Seaborg said the shortage of science teachers, especially in high schools, is alarming.

"Our major university graduate schools are going at half throttle because there is a lack of qualified research students interested in pursuing a scientific career," he said. Attractive fellowships are going unfilled, he added.

Dr. Seaborg, noted for his part in the discovery of five transuranium elements, stressed the "many rewards" for work in science. "So great is our society's reliance on science, the economic reward is very significant," he said. He added, "Those who succeed in expanding our knowledge of nature have the satisfaction of knowing that their contributions will benefit mankind."

Dr. Seaborg was introduced by Mrs. Donald P. Krotz, of Orinda.

Scientists Short Says Dr. Seaborg

There is a shortage of scientists in the United States today — and the country's survival may depend on them. One answer to this is the procuring of more good high school teachers of science, and perhaps some financial aid to potential scientists.

This was the message brought to parents of Acalanes High School students Monday night by Dr. Glenn Seaborg, co-winner of the Nobel Prize in chemistry in 1951, co-discoverer of plutonium and the fissionable properties of uranium, and leader in wartime studies leading to the atom bomb.

"THIS SHORTAGE is important," he told the group of 500 parents, teachers and students attending the parents' club "Science in Action" program, "because the very existence of our country depends on an adequate supply of scientists."

The most important reason for the lack, he said, is that "there is an acute shortage of good science teachers in the high schools.

"This is probably due to the fact that some prospective teachers are drawn into better paying jobs.

"MANY PROSPECTIVE students are able to secure well paying jobs immediately after graduation from high school, and so do not continue their education.

A Lafayette resident, Dr. Seaborg was introduced by a neighbor, Victor T. Johnson, vice president of the parents' club, and an engineer. Presiding at the session was Mrs. Donald Krotz, club president.

Demonstrations of biology, chemistry, general science, physics and physiology projects were participated in by 55 students. Acting as master of ceremonies for the students' exhibits was Jim Rupley, and a talk was given on peacetime uses of atomic energy, by Mary Ann Bates.

An illustrated problem in physics was worked out, without previous preparation, by Art Delerey, Jerry Coombs, Dave Fibush and Richie Johnson.

Science faculty members assisting were Margaret Nicholson, Barbara Cross, John Annis, Alex Winchester and James Nicholson.

Vienna Reporter Greeted By 'Mr. Atom,' U.C. Friends

BY FRIEDRICH KATSCHER

Three hundred thirty thousand gallons of gasoline is a huge amount of fuel. It fills a tank 40 feet in diameter and 35 feet in height and an average car could drive with it about 25 times the distance from the earth to the moon.

A few days ago, I clasped a small piece of black metal in my clenched hand. It was a cube with an edge length of a bit more than one inch, weighing one pound. This plain looking lump of matter contained the same quantity of energy as 330,000 gallons of motor fuel or 1,500 tons (40 average railroad freight cars) of coal: It was pure uranium, the raw material of the atomic age.

The man who showed me the nuclear fuel in the Radiation Laboratory of the University of California was himself one of the leading midwives of the atomic era: Dr. Glenn Theodore Seaborg, 42, professor of chemistry. He succeeded with his colleagues in preparing and identifying plutonium 239 and uranium 233, the only atomic combustibles besides uranium 235 which is found in natural uranium. Both elements have to be produced artificially in the atomic pile (nuclear reactor).

ATOMIC NUMBERS

Every element has an atomic number—hydrogen, for example, number 1, helium number 2, oxygen number 8, iron 26, etc. Uranium has number 92. This was the highest number until 1940. In this year, Professor Edwin M. McMillan discovered the first element heavier than uranium—element 93 (neptunium) — in Berkeley.

A few months later, Seaborg found plutonium which has number 94. Today we stop at atomic number 98. Seaborg was the co-discoverer of all these artificially produced elements beyond uranium (transuranic elements) from number 94 to 98 which do not exist in nature. Now he is searching for element number 99.

Mr. Katscher is writing for The Tribune while in the United States under special arrangement with the State Department.

The discoverer of a new element has the right to name it. Seaborg and his colleagues called element number 95 americium, number 96 curium (in honor of Pierre and Marie Curie, the discoverers of radium), number 97 berkelium and number 98 californium.

These names are accepted in the whole scientific world. Even the most anti-American Russian physicist has to use the designations americium, berkelium and californium which show for all time the country, the city, the state and the university where these elements were found and investigated in order to expand man's understanding of matter.

NOBEL WINNERS

Seaborg and McMillan, who pioneered also in other fields of nuclear science, received the Nobel prize in 1951. They are not the only winners of this highest scientific award working in the Radiation Laboratory in Berkeley. There is a third Nobel prize winner doing research there: Ernest Orlando Lawrence, the inventor of the cyclotron.

In the office of the associate director of the Radiation Laboratory, Dr. Donald Cooksey, I saw a scientific relic: A small gadget of glass, brass and sealing wax, about four inches in diameter. It was built by the then 29-year-old Lawrence in 1930 to test how his theoretical ideas about a new kind of atomic particle accelerator would work in practice. Across the road, a few hundred yards away from the simple looking instrument, there is a huge circular building, 215 feet in diameter, showing that Lawrence's theory was right. The diameter of the machine you can see inside is 110 feet and the weight of its magnet is 10,000 tons. It is the bevatron, the last child of the family of atom-smashers in use in Berkeley.

The best method to find out the properties of the atomic nu-

cleus is to bombard it with atomic particles and to observe the effects of the bombardment: Smaller or heavier particles might be knocked out of the target or it might be split in two. The nature and the behavior of the fragments form the basis of our knowledge about the atomic nucleus.

Some bombarding particles are found in nature—the rays emitted by radioactive substances like radium.

MACHINE GUN

Their speed and energy is too small to attack certain atoms. Therefore Lawrence conceived an idea how to produce a much more powerful artificial atomic "machine gun fire."

Electrically charged particles can be speeded up by electrical fields. The basic idea of Lawrence was to repeat this speeding up process several thousand and even million times. He used a circular chamber in which the particles run around and get a new push after each half-circle.

When it was seen that the idea worked, the accelerating machines called cyclotrons were built bigger and bigger and became more powerful. I saw some of them when I visited the Radiation Laboratory.

In the 184-inch (15 feet) synchro-cyclotron deuterons (nuclei of heavy hydrogen) can be speeded up to a velocity of 80,000 miles a second, that is 42 per cent of the velocity of light. When you visit the cyclotron during an experiment you do not see much because it is surrounded by concrete blocks, 10 feet thick, to protect you from the harmful radiation.

The laboratory has also a linear accelerator in which the particles go a straight line and get only 30 consecutive pushes; the energy of the atomic projectiles is therefore comparatively small.

NEAR TO LIGHT

Another machine, the synchrotron, accelerates electrons to almost the velocity of light. These fast tiny bullets then hit a metal target and thus produce high energy X-rays which are used for nuclear bombardments and research.

But the most imposing and impressive atom-smasher is the ring-shaped bevatron which is not yet completed. In this \$9,000,000 machine based on a theory of Professor McMillan, and built by William Brobeck, a beam of nuclear bullets will be speeded up to an energy thousands of times greater than that of natural radioactive radiation. This energy range will permit experiments on a new frontier of research, namely the artificial production of hydrogen nuclei.

In the first decades of this century the Mecca of atomic research was in Cambridge, England, where the famous Rutherford worked. Now the United States is the leading nation in nuclear science.

It has several famous research centers. One of the best is the Radiation Laboratory of the University of California in Berkeley where the world's leading nuclear physicists and chemists investigate the smallest objects of nature by means of the most gigantic machines.

Berkeley Gazette 2/25/54
**UC Scientists
Produce New
Element 100**

The production and chemical identification of element 100 was reported today by a group of nuclear chemists doing research for the Atomic Energy Commission in the University of California Radiation Laboratory.

The element was proposed by an unique new method of "fattening" up plutonium atoms with neutrons. In a two-stage process, a total of 15 neutrons were added to plutonium, finally giving the scientists atoms of element 100 with a mass of 254.

The experiments were done by the Berkeley scientists early in January with the AEC's Materials Testing Reactor at Arco, Ida. The Arco reactor is a prolific source of neutrons.

The research was reported by Bernard G. Harvey, Stanley G. Thompson, Albert Ghiorso and Gregory R. Choppin, in a chemistry seminar on the local campus. The four scientists are members of the chemistry group led by Dr. Glenn T. Seaborg, Nobel Laureate and professor of chemistry on the Berkeley campus.

SCIENTIFIC PAPER

A scientific paper on the research is scheduled for publication in the March issue of Physical Review.

The scientists said that due to the existence of unpublished information on element 100 the question of its first preparation should not be prejudged on the basis of its present announcement.

The new element has no use in making weapons or in the production of atomic power. It has a half-life of about three hours. It decays by the emission of alpha particles of roughly 7.2 million electron volts. It is chemically analogous to erbium, element 68, a rare earth.

The scientists said that while the number of atoms produced was small, the identification of the new element is regarded as definite. Identification rests upon the fact that it acts chemically like no other known element, and has properties that have been predicted for element 100 by means of the actinide concept developed by Dr. Seaborg.

Oakland Tribune 2/25/54
**U.C. Team Finds
New Element 100**

BERKELEY, Feb. 25.—A prediction he made less than a month ago was realized today by Dr. Glenn T. Seaborg, internationally-known University of California scientist.

Seaborg, head of the radiation laboratory's nuclear chemistry department, said on February 2 that man would

shortly be able to manufacture a new element.

He announced at that time that his nuclear scientists had discovered element 99.

Today, the Nobel laureate announced the production of a minute portion of element 100.

Until recently, science had been able to identify only 96 of the basic substances in the universe.

RESEARCH TEAM

Members of the research team under Seaborg are: Bernard G. Harvey, Stanley G. Thompson, Albert Ghiorso and Gregory R. Choppin.

Seaborg explained that the new element, produced in a so-called "fattening up" process, has no use in making atomic weapons or in the production of atomic power.

Element 100, the scientist said, has an atomic mass of 254, which is the heaviest known substance in the universe.

Experiments leading to production and identification of element 100 were conducted at the Atomic Energy Commission's Materials Testing Reactor at Arco, Idaho, he added.

The element retains identity for about three hours before decaying into another element form. It is chemically similar to element 68, a so-called rare-earth element known as erbium, Seaborg stated.

The report brings to light for the first time the production of synthetic transcurium—element 96—elements by means of neutron reactions. In the past the Berkeley scientists have reported the creation of these "super-heavy" elements only by cyclotron bombardment.

While only a small number of atoms of the new element were produced, Seaborg explained that identification rests upon the fact that it acts—chemically—like no other known element.

Seaborg earlier had developed a theory which has enabled him to predict the chemical and physical properties of elements up through element 103.

STAGE PROCESS

The scientist explained that a two-stage process was used in producing element 100.

First, he said, plutonium 239 atoms were placed in the Arco reactor and bombarded with neutrons, converting some of them into element 98, or californium.

After a chemical separation of some of the californium atoms, he continued, the material was returned to the reactor.

As additional neutrons were added to the californium nuclei, Seaborg said the element decayed into element 99. The process was repeated, he said, thus producing element 100.

Daily
Cal.
2/25/54

New element discovered by radiation lab scientists

Following close on the heels of element 99, element 100 has been produced and identified by a group of nuclear chemists doing research for the Atomic Energy commission in the University Radiation laboratory here.

Element 100 was produced by a unique new method of "fattening" up plutonium atoms with neutrons, according to a report issued this morning. In a two-stage process, a total of 15 neutrons were added to plutonium, finally giving the scientists atoms of element 100 with a mass of 254.

The experiments were done by the Berkeley scientists early in January with the AEC's materials testing reactor at Arco, Idaho.

The research was reported by Bernard G. Harvey, Stanley G. Thompson, Albert Ghiorso and Gregory R. Choppin in a chemistry seminar on campus. The four scientists are members of the chemistry group led by Glenn T. Seaborg, Nobel Laureate and professor of chemistry.

The new element has no use in making atomic weapons or producing atomic power, the scientists



GLENN T. SEABORG

said. It has a half-life of about three hours, decaying by giving off alpha particles. It is chemically analogous to erbium, element 68, a rare earth.

The scientists said that while the number of atoms produced was

small, identification of the element is considered definite. Identification rests on the fact that it acts chemically like no other known element, and has properties which Seaborg predicted for element 100.

The report brings to light for the first time the production of synthetic elements beyond curium by neutron reactions. In the past the scientists have reported creation of these elements only by cyclotron bombardment.

The reaction used to produce element 100 is a two-stage process. First plutonium 239 atoms go into the Arco reactor. When enough neutrons have been added to some of these atoms to convert them into atoms of californium, element 93, the sample is removed and the californium atoms are separated.

These californium 252 atoms are returned to the reactor in the second step of the process. After a neutron is added to their nuclei they decay into element 99 (253). One more neutron is added and the nuclei again decay by emitting a beta particle and element 100 (254) is formed.

s'identifie à celle de la science elle-même, à ce rythme prodigieux du xx^e siècle, où chaque jour voit une nouvelle grande invention qui tue celle de la veille.

C'est aussi la preuve qu'il est parfaitement déplacé d'ironiser sur la naïveté de ceux qu'on appelle ces « grands enfants d'Américains ». Les chemises à carreaux, les pom-pom girls et la hache de Stanford font sourire en Europe. Elles font sourire aussi les Californiens. Mais le Bevatron et la découverte, faite il y a deux mois, du virus de la poliomyélite ne sauraient faire sourire. Demain on apprendra peut-être qu'après le virus, c'est le sérum qu'un professeur de Berkeley aura découvert et que, du même coup, CAL aura vaincu le terrible fléau. L'enthousiasme est souvent naïf. Il est aussi souvent créateur.

NEW ELEMENT FOUND IN UC ATOMIC STUDY

J.F. Examiner 2/25/54
Identified by Scientists at
Idaho Testing Reactor

By WILLIAM BOQUIST

The production and positive identification of a new artificial chemical element—number 100—was announced yesterday by a group of University of California atomic scientists.

The new element, as yet unnamed, was manufactured by a new technique, known as "fattening up," in the Atomic Energy Commission's material testing reactor, at Aero, Idaho. So far as is known, it has no practical use.

In Chicago, the Argonne National Laboratory, an Atomic Energy Commission installation, announced simultaneously that its chemists also had isolated and identified element 100 as a result of bombarding plutonium with atomic particles in the Idaho reactor.

Heretofore, the various new artificial elements which have been added to those in the standard periodic table, have been made by bombardment in such atom smashers as the Berkeley cyclotron.

METHOD EXPLAINED.

By that method bombarding particles were forced to coalesce

with those in the nuclei of standard element atoms to form atoms of unstable new elements.

Thus atomic scientists manufactured all the artificial elements above uranium, number 92, which is the heaviest "standard" element.

Atom smashers have been responsible for the original manufacture of neptunium, number 93; plutonium, number 94; americium, number 95; curium, number 96; berkelium (named for Berkeley), number 97; californium, number 98 and eka-holmium, number 99, discovered earlier this month.

In simplest terms, the new element was formed by adding fifteen neutrons (neutrally charged nuclear particles) to the nucleus of each atom of plutonium, the atom bomb charge.

NEW ELEMENT FORMED.

Since the plutonium atom has a mass of 239—that is it has a total of 239 neutrons and protons in its nucleus—the addition of fifteen neutrons forms the new element, with a resultant mass of 254.

The method, of course, is far more complicated than that explanation.

Plutonium atoms are placed in the atomic oven and sufficient neutrons are thereby added to change part of the plutonium into californium, with a mass of 252.

The californium atoms are then separated chemically from the plutonium, are reinserted in the reactor and are gradually "fattened up" with the addition of other neutrons until the mass reaches 254.

That mass is the new element.

The half-life of element 100 is only three hours—that is one-half of its total mass decays away in each three-hour period.

HAS LITTLE VALUE.

It would appear to be of little value except as a scientific curiosity and as a further proof of physical theory, since it cannot be used for either atomic bombs or power plants.

Credited with the manufacture and identification of the element are these AEC workers at the Laboratory:
Stanley G. Orso and

under
Sea-
and
es-

archy turned out for Clint Evans' clambake for alumni and students. Clint is being retired at 65.

If he never did anything else, Clinter founded an institution peculiar to Cal. No other college, to our knowledge, has such intimate and joyous relations between the current crop and old grads.

Chancellor Clark Kerr, second only to Dr. Robert Gordon Sproul, told off the baseballers at Saturday's spaghetti luncheon.

"This is my first time at a baseball affair," Chancellor Kerr said. "I was a track man. I used to resent the baseballers standing around and telling stories while I was puffing the mile and two miles.

"Maybe they have something. Anyhow, my sympathies are with the umpires."

(Here Chancellor Kerr made a bow to Marty O'Toole and Seacap Christianson, ex-Coast League outfielder. They umpired the varsity vs. alumni game.)

Snap Judgment Goes Unchallenged

The chancellor recalled the days when he was an arbitrator in industry's friction with labor. His specialty is peace maker.

"There were some close calls," he said. "I spent sleepless nights trying to arrive at a fair decision. I will never challenge an umpire's snap judgment."

Arbitrating an industrial problem, the chancellor says, calls for infinite patience.

"After patience is exhausted, you tell both sides to go to Hades," he said. "When you assign yourself to the same place, then you are a fair judge."

Brutus Hamilton and Stan McCaffrey of high-level UC command, also said a few well-chosen words.

Dr. Glenn Seaborg, faculty representative, saluted the Clinter with this:

"No man in the athletic department fights harder for his boys than Clint Evans. When one of his boys run afoul of those silly academic rules, Clint is in there swinging for him."

He's Kidding About Silly Academic Rules

The tall and bashful Seaborg is merely a Nobel Prize winner in nuclear physics. He's kidding about silly academic rules. What he means is don't be slavishly literal.

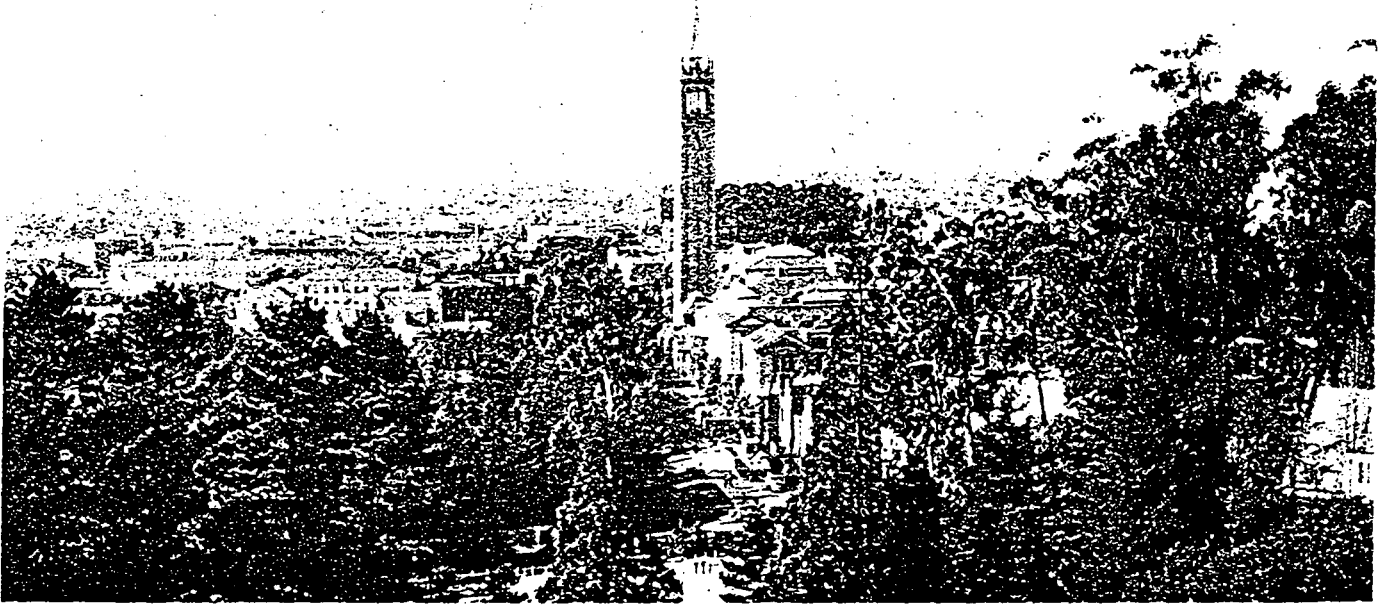
The atomic scientist saw a ball game, and the easy manner of alumni vs. varsity on Edwards Field, with wives and children in the stands encouraging the elderly athletes, must have impressed the physicist that human existence cannot be reduced to a formula.

The humor of schoolboy baseball is beyond understanding. You boot one and you don't worry about it. A bad hop. *S.F. Chronicle 2/22/54*

Will Zornitzky
The UC of Berkeley hier.

Paris Match
2/54

CAL



L'UNIVERSITE DE CALIFORNIE A POUR CENTRE PRINCIPAL LA VILLE DE BERKELEY (100.000 HAB.) OU RESIDE SON PRESIDENT. AU FOND, LA BAIE DE SAN-FRANCISCO.

Reportage Stéphane GROUEFF — Nick de MORGOLI

LE match était commencé depuis dix minutes. Ce jour-là les « Ours » recevaient sur leur propre terrain — en l'occurrence le vaste salon du gymnase de Berkeley — l'équipe de basket de San José. Au premier rang des gradins, Glenn criait plus fort que tout le monde.

Autour de lui les supporters des « Ours » suivant le match d'un œil et, de l'autre, les gestes de leurs cheer-leaders, c'est-à-dire de leurs chefs de claque, scandaient sans cesse de mâcher leur chewing-gum, le chant de ralliement de l'Université.

*Gr. r. r. r. r. Rah ! Gr. r. r. r. r. Rah !
Gr. r. r. r., R. r. r. r., R. r. r. r. rah !
Nous sommes les fils de Californie,
Nous luttons pour l'or et le bleu.*

En l'honneur de l'or et du bleu, couleurs de l'Université de Californie, Glenn Seaborg chantait avec eux. Sa silhouette tranchait parmi cette multitude de cols ouverts et de pull-overs multicolores. Seul probablement dans la salle, il porte veste et cravate. Enfin son maigre visage accuse vingt ans de plus que ceux des jeunes gens qui l'entourent. Encore paraît-il moins que son âge.

En réalité, Glenn Seaborg a quarante et un ans. Il n'est pas étudiant. Mais c'est lui qui représente l'Université de Californie à la Conférence du football, suprême autorité qui, pour toute la Californie, fixe le programme de la saison, sélectionne les joueurs et règle les différends. Il a la réputation de ne pas se laisser faire et l'on dit qu'il défend les « Ours » avec un acharnement de tigresse. Il est aussi féru de basket-ball, ainsi que son enthousiasme d'aujourd'hui en fait foi.

Par ailleurs Glenn — Dr Glenn Seaborg, prix Nobel 1951, l'homme qui découvrit le plutonium, métal qui permit de réaliser la bombe atomique — est professeur de chimie à l'Université de Californie. Mais n'allez pas lui dire qu'une faute d'arbitrage au cours d'une rencontre sportive entre étudiants n'a qu'une importance minime eu regard du problème des « éléments lourds », objets de ses recherches actuelles. Demain, à son cours, il parlera mésons et neutrons, cyclotron et synchrotron. Pour le moment, il n'est pas disposé à parler autre chose que basket. Que diable, une « sortie » est une « sortie », même pour un prix Nobel. C'est pourquoi, au nouveau signe du cheer-leader, le Dr Seaborg scande avec une énergie redoublée : Gr. r. r. r., R. r. r. r., R. r. r. r., rah !

Arrêtons-nous sur cet instantané. Il est brutal mais typique : il a valeur de symbole. Ce prix Nobel scandant le R. r. r. r. rah en l'honneur de l'équipe de basket de son « college », c'est toute l'Université américaine. Pas seulement l'Université de Californie. Dans n'importe laquelle des 1.005 universités d'Amérique — le pays qui en compte le plus au kilomètre carré — on pourrait photographier deux ou trois fois par semaine une scène semblable. L'Université de Californie — CAL, comme ses 33.382 étudiants l'appellent — n'est pas une exception, elle est simplement l'exemple le plus représentatif de la jeunesse américaine.

Elle n'est pas le plus vieux, ou le plus riche, ou le plus sélect *college* d'Amérique (où l'on appelle *college* ce qui correspond à nos universités, et high-school l'équivalent de nos lycées et collèges). Elle est simplement le plus grand.

Fondée il y a quatre-vingt-cinq ans seulement, à une demi-heure de la ville de Berkeley, sur le bord de la magnifique baie de San Francisco, elle s'est développée comme tout ce qui pousse sous l'ardent soleil californien, à une vitesse vertigineuse. CAL est une université champignon. Un champignon qui a si démesurément grossi qu'il a éclaté. Aujourd'hui, l'école mère de Berkeley est entourée, comme une poule de ses poussins, de sept « campus » nouveaux :

Los Angeles, rival de Berkeley, qui groupe à lui seul 13.470 étudiants et possède, soit dit en passant, la meilleure équipe de football.

Davis, centre des études agronomiques.

San Francisco, où se trouve la Faculté de médecine.

Mount Hamilton, que son altitude a voué à l'astronomie (le télescope de son laboratoire est le deuxième du monde par ses dimensions ; le premier, celui de Palomar, étant également californien).

Riverside, où cohabitent une faculté des Lettres et la « Citrus Experiment Station », spécialisée dans l'horticulture subtropicale.

Santa Barbara, consacrée aux arts.

Enfin La Jolla, célèbre par son « Scripps Institute », centre de recherches océanographiques le plus vaste et le mieux outillé du monde.

Mais CAL s'enorgueillit moins de détenir le record du nombre des étudiants, que d'égalier par la qualité de son enseignement Harvard, Yale ou Stanford, qui sont bien plus vieilles qu'elle, et d'être comptée aujourd'hui parmi les cinq meilleures universités américaines. En fait, elle est la première avec Illinois pour les sciences physiques, comme Yale et Princeton le sont pour les lettres, Columbia pour le droit, Harvard pour les sciences commerciales (et aussi le droit et la théo-

logie), Cornell pour la médecine, etc.

CAL est, de tous les collèges américains, celui qui possède la plus belle collection de prix Nobel. Le campus de Berkeley en réunit six à lui seul. M. Wilkes, du Bureau de Presse de la section scientifique, se plaint de ne pas suffire à la tâche de publier les communiqués sur les découvertes faites dans ses laboratoires. Les régents de CAL (c'est-à-dire le conseil d'administration) sont si gâtés que pour eux, à moins d'avoir inventé le cyclotron, ou découvert une nouvelle hormone, on ne saurait être un bon professeur.

Pour un Européen, à première vue, un tel exclusivisme apparaît naïf, pour ne pas dire choquant. Il est d'ailleurs hors de doute qu'il entre une part de

snobisme intellectuel dans cet engouement pour les prix Nobel. Mais le danger est beaucoup moins grand qu'il ne paraît. Il y aurait danger grave si le professeur des universités américaines répondait à l'image caricaturale du savant qui hante encore nos imaginations européennes : celle d'un docteur Faust barbu et sale, distraît au point d'oublier de vivre, capable de faire sauter ingénument la moitié de sa ville pour vérifier une hypothèse, et ignorant de l'existence d'un animal appelé homme. Un Glenn Seaborg n'a pas grand-chose de commun avec cet hurluberlu.

En fait, sauf peut-être en Russie (mais il est impossible de s'en assurer), il n'y a pas d'université au monde où les professeurs soient plus en contact

avec les étudiants, et les étudiants avec les faits plutôt qu'avec les livres, que les *colleges* américains. La science s'y fait plus qu'elle ne s'y apprend. Les diplômés de physique ou de biologie ont tenu eux-mêmes l'éprouvette dans laquelle le docteur Stanley (prix Nobel), cherchant une réponse à la question : « Qu'est-ce que la vie ? », a réussi à isoler un virus qui paraît être la frontière du règne minéral et de la vie organique. Ils ont entendu Mac Millan (prix Nobel) leur raconter en fumant une cigarette, pendant le quart d'heure de récréation qu'ensemble ils s'étaient accordés, comment il s'y est pris pour découvrir (il avait alors trente-deux ans) le neptunium, premier élément chimique que l'homme ait créé artificiellement. Avec Ernest Lawrence (prix

Nobel), ils ont tour à tour bombardé des atomes dans le cyclotron.

La fortune de CAL : 18 milliards de francs

Il va sans dire que tout ce matériel scientifique suppose des ressources financières considérables. Mais c'est là une des caractéristiques des universités américaines : elles sont riches. La fortune de CAL est évaluée à 50 millions de dollars (17.500.000.000) (celle de Harvard, la plus riche à 209 millions de dollars, ce qui fait de cette université l'une des premières puissances financières des Etats-Unis).

Le budget de CAL, pour cette année scolaire 1953-1954, s'élève à 71.087.951 dollars (25 milliards de francs), dont l'Etat de Californie a payé environ les trois quarts. A ce budget fabuleux s'ajoutent encore les donations en espèces ou sous forme de locaux, de bibliothèques et de laboratoires que font aux universités les milliardaires et les grandes compagnies, soit par philanthropie, soit pour réduire cette part du lion que le fisc se taille dans leurs revenus. Ainsi à Berkeley, sur la tour carrée qui s'élève au milieu de l'université, et qui en est devenu le symbole, on lit sur une plaque de marbre : « Don de Mme Jane Sather » Hearst, le magnat de la presse, a fait construire à ses frais le gymnase féminin et l'Ecole des Mines ; John Rockefeller, la Maison Internationale, etc. Pour le mois d'octobre, les dons en argent s'élevaient à 1.110.456 dollars (400 millions) ; pour novembre, à 718.160 dollars (250 millions). Les recherches scientifiques englobent une énorme partie de cette provende miraculeuse. Pas tout cependant. Il en reste toujours assez pour distribuer par centaines (800 depuis octobre) des bourses aux étudiants pauvres. Et c'est ce qui fait que les universités d'Amérique sont, grâce à leur richesse, les moins chères, les plus démocratiques.

Les clubs d'étudiants s'appellent "Fraternités"

La vie de collègue ne coûte plus assez cher pour rester le privilège d'une classe. Le budget annuel d'un étudiant s'établit à peu près ainsi : 75 dollars de droits de scolarité, 40 à 60 de livres, 15 de cotisations aux diverses organisations estudiantines, de 420 à 1.000 pour la nourriture et la chambre, 75 à 200 pour le blanchissage, la toilette et les frais divers. Au total, un étudiant pauvre dépense donc au moins 524 dollars (185.000 francs), un étudiant riche 1.340 dollars (475.000 francs). En fait, les frais moyens d'un étudiant moyen oscillent autour de 950 dollars, soit environ 335.000 francs. A ne considérer que le cours du change, cette somme

peut paraître élevée. Si l'on se souvient que les salaires et le standard de vie américains sont à peu près triples des nôtres, elle s'avère très modique.

Du reste, il s'en faut de beaucoup que tous les étudiants américains aient les moyens de vivre plusieurs années sans travailler (la durée des études à CAL est de quatre ans au moins pour le grade de *bachelor*, et de six ans pour ceux de M. A., « Master of Arts », ou de M. S., « Master of Science »). De toute façon, tous, plus ou moins, exercent un travail manuel tout en poursuivant leurs études. Les pauvres, pour payer leur entretien, les riches pour se procurer un appoint d'argent de poche ou tout simplement par tradition. C'est qu'ici le travail manuel, même quand il est une nécessité, n'est pas humiliant. Personne ne rougit, au contraire, de conduire des camions, de faire la plonge dans un restaurant, de servir à table chez M. X... ou Y... et de garder les « babies » le soir quand les parents sont au cinéma. Les moins favorisés s'unissent pour former des coopératives. Les tâches sont réparties : les uns achètent les vivres, d'autres les préparent, d'autres les servent. Tous mangent. Et la plupart, tout pauvres qu'ils sont, se rendent tout de même à l'université en voiture — une voiture qui n'est pas neuve, qui n'a peut-être coûté que 80 dollars (30.000 francs), mais qui leur appartient.

Le trait le plus caractéristique — mais non le plus enviable — de la vie estudiantine américaine est le club qu'on appelle « Fraternité » chez les garçons, et « Sororité » chez les filles. Les noms de ces clubs sont toujours des lettres de l'alphabet grec, par exemple, Alpha-Chi-Omega, ou Delta-Sigma-Epsilon. Chaque fraternité ou sororité possède sa maison où habitent cinquante à soixante membres et où l'on trouve pianos, télévision, disques, ping-pong, etc. Chaque année on élit une « reine », jolie et aimable étudiante, qui jouera le rôle de maîtresse de maison le jour où l'on aura des invités. Il y a des clubs chics où les garçons de bonne famille n'admettent que les enfants de bonne famille. Il y a des clubs qui se piquent de réunir la fine fleur intellectuelle, d'autres de fournir les meilleures équipes sportives. Leurs membres considèrent toujours la fraternité ou la sororité à laquelle ils appartiennent comme la meilleure « in the world », et toute leur vie ils gardent un contact avec elle.

Ce fanatisme ne va pas sans tragédies. Au début de l'année scolaire, les nouveaux essayent de se faire inviter dans les divers clubs afin de fixer leur choix. On appelle cette période « le rushing ». Mais il ne suffit pas de postuler pour pouvoir être admis. Une jeune fille, qui ne brille ni par la naissance, ni par la beauté, ni par l'esprit, a peu de chance d'entrer dans une sororité, tout au moins dans une

sororité chic. Dans un pays où dès l'âge de douze ans les jeunes filles commencent à parler de « complexes », cela peut tourner au drame. Des mélancolies chroniques et crises d'agressivité aiguës n'ont pas eu une autre origine. On dit même qu'il y a eu des cas de suicide. Aussi le système des clubs a-t-il des adversaires déclarés.

Les "anciens" sont plus sévères que les parents

Admettant, la vie des « fraternités » est des plus agréables. On loge à deux ou trois par chambre, on prend les repas tous ensemble, on invite des amis appartenant à d'autres clubs, on organise des « parties », des représentations théâtrales, des rencontres sportives. Chaque fraternité (il y en a qui ont déjà cent ans d'existence, telle Phi Mu, fondée en 1852) a ses traditions, ses chansons, ses secrets. Le jour, liberté complète ; chacun fait ce qu'il veut. Le soir, les jeunes recrues sont tenues de rentrer à l'heure dite. La discipline est établie par les anciens et elle est stricte, souvent plus stricte que celle des parents. Du reste, les rébellions sont rares : le règlement intérieur fait partie des traditions et les traditions d'une fraternité sont sacrées.

Parmi ces traditions, la plus importante et la plus pittoresque est celle du sport. Mais il ne faut pas s'abuser. Le développement du sport universitaire américain est si exorbitant, les performances accomplies si extraordinaires, et la publicité qu'on fait autour tellement « glamorous » qu'on a tendance à croire en Europe qu'il suffit à un étudiant américain d'être champion de saut à la perche pour décrocher n'importe quel examen.

La preuve que rien n'est plus faux, c'est qu'en ce moment même à CAL, toute l'Université prie pour que le « halfback » Paul Larson, vedette de l'équipe de football, obtienne la mention « C » en fin de semestre. C correspond à la moyenne. Si un étudiant n'a pas obtenu C, il ne peut pas jouer dans une équipe universitaire. C'est une règle sans exception, dont la violation scandaliserait également professeurs et étudiants.

De tous les sports pratiqués dans les universités de l'Ouest, où ils le sont tous et toute l'année, grâce à un climat exceptionnellement clémente, le football est de loin le plus populaire. (Il s'agit du football américain, jeu brutal qu'on ne peut pratiquer qu'accoutumé d'un casque et de vêtements spéciaux, et beaucoup plus proche du rugby que de notre football. Les Américains appellent celui-ci *soccer*, et le considèrent comme un sport de second plan.)

La passion du football, la tradition, les légendes des grands champions et la rivalité aiguë des équipes ont suscité autour de ce sport une véritable

mythologie. Si vous demandez à un Californien ce qu'est le « Big Game » (le grand jeu), ou bien il pensera que vous vous moquez de lui, ou bien, lui vous demandera ce qu'on vous a appris à l'école. Le « Big Game », événement « mondial », est la rencontre annuelle (la première eut lieu en 1892) des Ours de Berkeley et des Indiens de Stanford. Elle a lieu en novembre, et c'est le plus grand événement sportif de l'année.

La hache de Stanford a été volée quatre fois

Le signal de la fête est l'entrée sur le stade de la mascotte des Californiens l'ours Oski — un étudiant déguisé. Tandis qu'il se livre aux acrobaties et bouffonneries traditionnelles, des dizaines de milliers de supporters de Cal, dirigés par les « cheer-leaders », scandent le cri de guerre de l'Université : « Oski Wow Wow », tandis que les « pom-pom-girls » agitent rythmiquement leurs banderoles multicolores. Le délire atteint son point culminant au moment de l'entrée des équipes. La musique joue alors la célèbre marche de jazz : *When the Saints Go Marching On*. Tout un côté des gradins hurle : « Cali-fornia, Cali-fornia ! ». L'autre côté répond : « Stan-ford ! »

La fameuse Hache de Stanford, trophée du « Big Game » vaudrait à elle seule un livre. Jadis les étudiants de Stanford avaient pour emblème une hache qu'ils amenaient sur le terrain les grands jours et qu'ils agitaient en criant à leurs joueurs : « Give them the axe... right in the neck. » (Cognez leur dessus... en plein sur le cou.)

Le 15 avril 1899, la hache disparut. D'adroits Ours l'avaient dérobée, ramenée à Berkeley et enfermée dans le coffre-fort d'une banque. Une fois par an, le jour du *Big Game*, on l'exposait aux yeux du public, mais non sans la faire garder à vue par une solide escouade d'« armoires à glace ». Pendant trente et un ans, les malins de Stanford renouvelèrent en vain toutes les ruses de guerre pour récupérer leur bien. Enfin, le 3 avril 1930, au cours de la cérémonie officielle d'exposition, une équipe de pseudo-photographes lança tout à coup des bombes lacrymogènes au milieu de l'équipe de protection, et, profitant de la confusion, disparut avec la hache. Stanford avait sa revanche. Mais les rapports des deux universités s'envenimèrent à tel point que, plutôt que de déclencher une guerre civile, on décida d'un commun accord de faire de la hache un trophée qui chaque année irait au vainqueur. Cette tradition fut respectée jusqu'en 1933, année où la hache fut de nouveau volée, puis retrouvée. En 1947, même incident. Actuellement, personne ne sait où elle se trouve.

Pour la quatrième fois elle a disparu au printemps dernier. En fait, cette disparition a arrangé tout le monde, car on n'aurait pas su à qui l'attribuer : le *Big Game*, cette année, s'est terminé par un match nul.

On a peine, en Europe, à se représenter autrement que sous des couleurs caricaturales une telle frénésie dans la passion du sport. On se représente mal ces immenses parcs à autos aux portes des universités. Qu'y a-t-il de commun entre ces CAL et nos étudiants français ?

La réponse est simple : tout... Tout sauf la chance. Les étudiants du Cal ont la chance d'avoir des universités riches dans un pays riche, un climat qui leur permet de nager et de se promener en chemise à col ouvert douze mois par an, des conditions de vie assez faciles pour que leur adolescence se poursuive plus longtemps qu'ailleurs et avec plus d'éclat.

Au demeurant, ils sont les mêmes que les étudiants de partout. Ils montent les mêmes canulars, ils ont le même trac aux examens, ils font les mêmes plaisanteries salées à la sortie des cours, ils ont les mêmes fausses hontes devant les jeunes filles, et chez eux, comme chez tous les étudiants du monde, les anciens (seniors) briment les *freshmen*, autrement dit les bleus, les bizuths. A Berkeley, le banc le plus confortable du parc porte l'inscription : « Réservé aux seniors. » Malheur au *freshman* qui oserait s'y asseoir.

Il y a parmi eux des « bûcheurs », des « intellectuels » qui méprisent les sports, des « affranchis » (smart guys) qui ne parlent qu'argot, des « étudiants éternels » aux tempes grisonnantes. Il y a surtout comme partout des jeunes gens sains et simples, à qui les blagues ne font pas perdre le sens du sérieux. En fait l'étudiant de 1953 est beaucoup plus sérieux, et d'autant moins pittoresque, que celui de 1943. C'est le résultat du passage des vétérans. Après la guerre, le gouvernement décida de payer les études de tous les vétérans qui le désiraient. Ce fut la panique chez les professeurs et chez les parents. Quel effet désastreux ces soldats, habitués à tous les excès, n'allaient-ils pas avoir sur la discipline ?

Les soldats étaient en réalité des gens pressés. Les blagues des étudiants n'avaient pas de sel pour eux. Ils voulaient vite un diplôme et le meilleur diplôme possible. Ceux dont on craignait le pire donnèrent le meilleur exemple. Il n'y eut jamais étudiants plus appliqués que les vétérans américains.

Un professeur gagne 4 millions par an

EN général tout ce peuple estudiantin, au contraire de ses camarades euro-

péens, ne s'intéresse guère à la politique. Cependant une petite minorité se dit « libérale » — on dirait « de gauche » à Paris. Sa tête de turc est Mac Carthy, son grand homme Adlai Stevenson. Il existe à Berkeley, dans la rue Bancroft, une librairie communiste dont la devanture est remplie d'œuvres et de portraits de Marx, de Staline et du chanteur noir Paul Robeson. On passe devant sans s'arrêter. Il y a pourtant un problème communiste à l'Université, quoiqu'il n'y ait pas de communistes.

Ce problème s'est posé à cause du « serment d'allégeance ». Les citoyens californiens ne voulaient pas de professeurs communistes dans leurs universités. En tant que contribuables, ils s'estimaient en droit de faire instruire leurs enfants comme ils l'entendaient. Les Régents de CAL furent de leur avis. Ils demandèrent à leurs 4.732 professeurs, assistants et instructeurs de certifier qu'ils n'étaient pas communistes. Quinze professeurs seulement refusèrent. On les mit à la porte. Ce fut un fameux scandale. Car on s'aperçut alors qu'ils n'étaient pas communistes. « Si nous étions communistes, disaient-ils, nous signerions. Si nous ne signons pas, c'est pour une question de principe ; c'est que nous trouvons votre procédé humiliant, anticonstitutionnel et non académique. » La Cour Suprême, devant laquelle ils firent appel, les réintégra. Actuellement, un second procès est en cours : il s'agit de savoir si l'Université devra leur payer leur traitement depuis la date de leur suspension. (Un professeur de CAL gagne de 3 à 4 millions de francs par an selon qu'il enseigne neuf ou onze mois dans l'année.)

Ils ont trouvé le virus de la polio

Ce mois-ci, après cinq ans de travail et après avoir dépensé des milliards, le laboratoire de radioactivité de CAL achève et se prépare à essayer la plus grande machine à bombarder les atomes qui soit au monde. Cette machine fantastique s'appelle le Bevatron. C'est un électro-aimant circulaire de 33 mètres de diamètre et qui pèse 10.000 tonnes. Les savants du monde entier attendent avec impatience les premiers résultats des expériences qu'il va permettre et qui ne peuvent manquer d'apporter des révélations sensationnelles.

Cependant le Bevatron de Berkeley sera à la fois le premier et le dernier du monde. Avant même qu'il soit terminé, une nouvelle machine plus puissante et beaucoup moins onéreuse est déjà réalisée sur le papier. Qu'importe ! Pour les étudiants et les professeurs de CAL, cette vie brève du Bevatron n'est pas signe d'échec mais, au contraire, signe de succès et titre de gloire. C'est la preuve que la vie de leur Université

SPEAKS HERE TONIGHT

Nobel Scientist To Tell Peacetime Use of Atoms

By JOHNNIE CRESENS

A noted scientist arrived here Wednesday to tell Austin and University of Texas audiences how the atomic energy he helped unleash can be put to work for the benefit—rather than the decimation—of mankind. Dr. Glenn T. Seaborg, 1952 Nobel Prize winner and developer of many atomic elements, declared in an interview shortly after his arrival at the Municipal Airport that atomic energy even now is proving useful in all fields of science, particularly medicine. The famed University of

California chemistry professor directed discovery of the atomic element plutonium. His research, and that of his associates, have made possible most of this country's development of atomic power.

Dr. Seaborg will give a public lecture Wednesday at 8 p. m. in Geology Building 14 at the University, and will present talks at 10 a. m. and 3 p. m. both Thursday and Friday before University chemistry students. His appearance here is under the auspices of the University chemistry department; the University Public Lectures Committee will join in sponsoring his Wednesday night address.

In his public speech on "Industrial Atomic Power," Dr. Seaborg said, he will explain—in laymen's terms—"how the power resident within the atom that has been used so successfully in weapons also can be used as a source of industrial power."

The difference, Dr. Seaborg noted, is in the rate at which the energy is released. For industrial purposes, atomic power can be released from a machine "as slowly as you please."

"Because of the compact weight of atomic fuel," he continued, "it would be a great advantage for generating energy in places where the weight of the fuel is a hindrance."

As an example, he cited that one pound of uranium, with a complete fission reaction, can produce the equivalent in heat energy of 2,000 tons of coal. This heat energy, he added, can be transformed to electric energy by conventional methods.

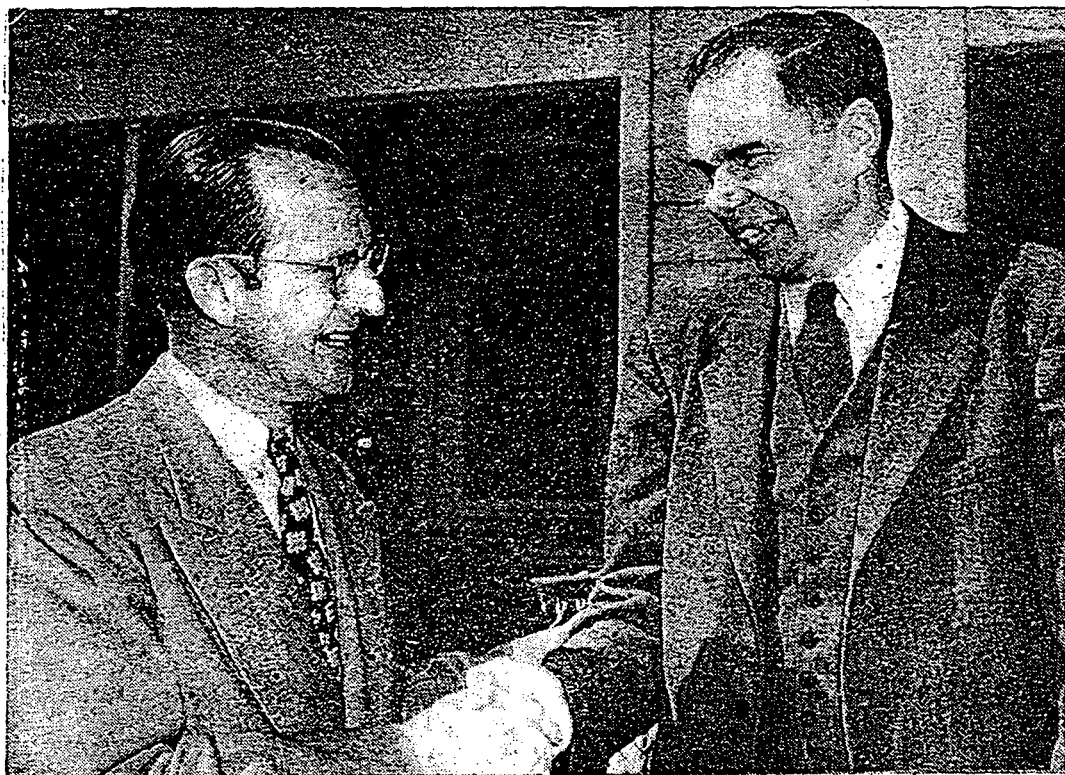
On the other hand, however, Dr. Seaborg doubted that atomic energy ever would replace other kinds of power-producing fuels such as coal, oil and gasoline. It will be, he said, merely a supplement, since atomic energy machines would be so big, and require so much shielding, as to be impractical in some industrial situations.

An even more heartening use of the atom lies in its tremendous potential in the medical field. This is a present use of atomic power. Dr. Seaborg emphasized, commenting that thousands of shipments of radioactive substance for medical research go out every year from the Oak Ridge National Laboratory in Tennessee.

The medical technique to which he referred involves this procedure: an element to be traced in a reaction is "tagged" or "labeled" by mixing it with a radioactive form of the same element, then instruments trace its path through a reaction.

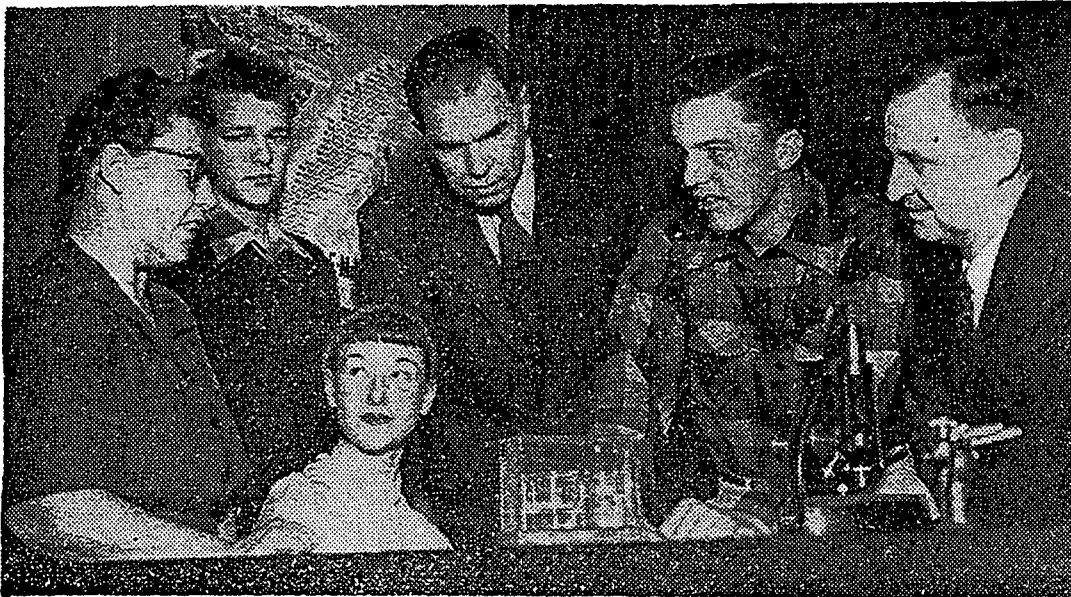
Thus the atom can be used in medicine for both diagnostic and therapeutic purposes—and is especially important, Dr. Seaborg observed, in studying the mechanism of the formation of disease, so that the disease can be counteracted and eradicated.

The "100th element," whose discovery made big news in the world of science last week, actually was foreseen by Dr. Seaborg at least 10 years ago.



Austin Statesman
SCIENTIST ARRIVES—Dr. Glenn T. Seaborg, (right) noted chemist whose discoveries led to most of this nation's development of atomic power, is shown being welcomed to Austin by his host for a three-day stay here, Dr. George W. Watt, University of Texas chemistry professor. Dr. Seaborg, a University of California chemist, arrived by plane

3/10/54
Wednesday morning, carrying a heavy overcoat over his arm. "You won't need that in Texas," Dr. Watt told him. "Yes, but I needed it when I left California," the famed scientist quipped. Dr. Seaborg will give a public lecture at the University Wednesday at 8 p. m. on "Industrial Atomic Power."—(Neal Douglass Photo.)



Tribune photo

Dr. Glenn T. Seaborg (center), University of California's Nobel Prize winning nuclear scientist, and Don Krotz (right), California Research Corp. official, encourage Acalanes High School science teacher Miss Margaret Nickerson (left) and students George Coad, Ilse Dix and Bob Eberhard (from left) concerning Science Fair participation April 23-May 2.

Acalanes High Students Prepare for Science Fair

LAFAYETTE, April 5.—Acalanes High School will be represented by six individual entries and two group exhibits at the first annual San Francisco Bay Area Science Fair, April 23 to May 2.

Exhibits in the senior and junior divisions of the biological and physical science categories will be displayed from county public, parochial and private schools in 12 Bay area counties.

The Fair will be held in the California Academy of Sciences Building at Golden Gate Park, San Francisco.

The boy and girl with winning exhibits in the senior division and their sponsoring teachers will be sent to the Fifth National Science Fair at Purdue University, May 13-15.

INDIVIDUAL ENTRIES

Exhibits from Acalanes High School, at the San Francisco Bay Area Fair will include these entries in the individual classification:

Bob Cooper, long distance television reception; Bob Eberhart, plant growth experiment; Ilse Dix, leukemia in white rats; Doug Krotz, bacterial growth; Herb Yonge, antiseptic effect of common substances; Bob Johnson, Pasteur experiments.

Group exhibits will include the following:

Lanny Erickson and Ed Wilent, measurement of effect of humidity on speed of sound; Jack Kitchen and Walton Cheney, plant growth with mineral deficiencies.

TEACHERS AID

Science teachers Barbara Cross, Alex Winchester, John Annis and department chairman Margaret Nicholson have been acting in advisory capacity for the students' preparing the Acalanes exhibits.

The Bay Area Science Fair is sponsored by leading educators, educational institutions, scientific societies and industrial and civic groups in 10 counties of the San Francisco Bay Area.

Sverige-Nytt

NEWS FROM SWEDEN — AIRMAIL WEEKLY IN SWEDISH AND ENGLISH

18 maj 1954

nytt grundämne

Svensk forskargrupp framställde nytt grundämne på Nobelinstitutet

Ett nytt grundämne har framsett av ett svenskt forskarlag i den stora cyklotronen vid Nobelinstitutets avdelning för fysik i Frascati. Det är en ny isotop av ett nytt, ännu namnlöst ämne med nummer 100 av vilket hittills mindre än hundra atomer producerats. Det första spåret på den nya isotopen fick man i mitten av februari i år, och i dagarna har man äntligen fått säkra bevis för att det är det sökta ämnet.

Medlemmarna av det forskarlag, som nått detta förnämliga resultat vid den Siegbahniska institutionen, är docent Lars Melander, fil. lic. Hugo Atterling, fil. mag. Vilhelm Forsling samt civilingenjörerna Lennart W. Holm och Björn Aström.

De berättar att framställningen tillgick så att uran bombarderats med kol- och syrekärnor. Dessa har i cyklotronen fått såka karusell tills man nått höga energier. Resultatet har blivit ett nytt grundämne samtidigt som det tidigare kända, konstgjorda grundämnet californium med nr 98 producerats. I en glaskolonn med en s. k. katjonbytare har kemisterna separerat de båda ämnena. Man har fått fram det nya ämnets atomer i en lösning, droppvis ur kolonnen. Nr 100 kommer 8-10 droppar före californium.

I naturen finns det ett 90-tal grundämnen, varav uran är det tyngsta med nr 92. Med olika metoder har man tillverkat även tyngre grundämnen, s. k. transuraner med atomnummer 93-100. Av varje grundämne finns det flera varianter, s. k. isotoper. De är varandra kemiskt alldeles lika, men har en liten skillnad i atomvikt. En annan isotop av grundämne 100 har nyligen framställts vid professor G. T. Seaborgs laboratorier vid Californiauniversitetet i USA. Rapporten om det offentliggjordes i början av april i år. Den isotopen hade man fått fram med hjälp av en uranreaktor. Den svenska isotopen av ämne 100 är således inte bara en ny variant av grundämnet i fråga, utan även framställd på ett nytt sätt.

5/18/54
New \$1,200,000 Atom Smasher Planned at U.C.

BERKELEY, May 18.—A new atom smasher, shaped like an oversized pontoon, will be built at the University of California's radiation laboratory by the Atomic Energy Commission for \$1,200,000.

The new machine—a heavy particle linear accelerator—will carry on new investigations in the field of nuclear chemistry. Dr. Glenn T. Seaborg, Nobel prize winning university chemist, will be in charge of the project.

Studies with the new atom smasher—scheduled for com-

pletion within three years—will include production and identification of new elements and new isotopes of known elements.

According to the university, the new linear accelerator will be nine feet in diameter and 108 feet long and will produce atomic particles with energies reaching 200,000,000 electron volts.

Linear accelerators, like the cyclotron and bevatron, bombard target atoms with atomic particles moving at ultra high speeds. *Oakland Tribune*

Berkeley Gazette 5/18/54
\$1,200,000 Job Ordered by AEC—Will Take 3 Years

Another atom smasher will soon be added to the array of University of California equipment presently probing the mysteries of atomic energy, it was revealed today.

The new machine will be completed in three years at a cost of \$1,200,000, authorized by the Atomic Energy Commission. It will be of a new design especially constructed to utilize

relatively heavy particles such as beryllium with an atomic weight of 9 and neon with a weight of 20.

Most atom smashers constructed to date use light particles such as helium with an atomic weight of 4. The new machine may possibly use atoms as heavy as silicon with a weight of 28.

A similar accelerator will be built at Yale University, the AEC announced. Both machines will produce particles with a terminal energy of more than 200,000,000 electron volts.

RARE ELEMENTS

Such energy will be sufficient to allow bombarding nuclei to interact with even the heaviest known elements, UC scientists said today.

Dr. Glenn T. Seaborg, professor of chemistry and head of the University's Radiation Laboratory's nuclear chemistry group, will be in charge of the machine.

It will be seven feet in diameter and 108 feet long. Housing the accelerator will be a light steel frame building with dimensions of 50 by 150 feet.

Construction of the new atom smasher may make possible the synthesis of elements heavier than 100, the heaviest now known, UC officials said. It will also provide many rare elements in abundance and pure form for research.

New Atom Smasher To Be Built at U. C.

A new, elongated atom smasher which may produce synthetic elements of an atomic weight far beyond anything found in nature is to be built on the University of California campus, it was announced yesterday.

The machine—and another like it at Yale University—will cost \$1,200,000 and will be financed by the Atomic Energy Commission.

In theory, at least, the new machine will be able to add to the old periodic table of elements new artificial atoms with weights as high as 270.

BEYOND OLD LIMIT.

The highest natural element has an atomic weight of 238, but, working with other types of atom smashers, UC physicists already have fashioned man made atoms of weights ranging up to 254.

The new machine is of the type known as a linear accelerator.

While most atom smashers speed their particle bullets around a circular track before diverting them to strike against a target, the linear accelerator shoots its bullets down a long, straight gun barrel, with each bullet riding the crest of a micro-wave.

Stanford University already has in operation the world's largest linear accelerator, developing a potential energy of 1,000,000,000 electron volts. By contrast the new UC machine will develop only 200,000,000 electron volts.

TYPE OF BULLET.

The major difference between the two machines lies in the type of bullet used.

The Stanford linear accelerator propels electrons, the light weight particles that swirl around the nucleus of the atom, like planets around a sun.

The new machine will use bullets thousands of times heavier. These will be the nuclei of such elements as carbon, oxygen, aluminum, silicon and neon, with atomic weights ranging up to twenty.

Conventional cyclotrons use as bullets the nuclei of hydrogen and helium, with atomic weights ranging up to four.

CALIBER DIFFERENCE.

Thus the caliber difference is something like that between a .22 and an elephant gun, leaving velocity out of it.

Except in theory, Nobel Laureate Glenn T. Seaborg and his group of nuclear chemists do not know what will happen when they fire these projectiles into uranium and thorium.

There will be nothing dangerous about it. It will be strictly laboratory research, involving microscopic quantities of matter.

The resulting artificial elements are certain to be heavy beyond anything ever seen before and they may be extremely freakish.

Working with the lighter "caliber" bullets, University of California scientists already have produced seven elements heavier than the heaviest of the standard, naturally occurring element, uranium.

But in the case of each new element, it has been a job of working up notch by notch, adding a particle here and there and letting one element revert to another through instability.

The new machine—it is expected—will permit the fashioning of new and heavier elements in relatively large leaps.

The new machine will be 108 feet long and seven feet in diameter.

Huge Atom Smasher Planned on UC Campus

S.F. Examiner

5/19/54

A huge new, elongated atom smasher which may produce monstrous and unstable elements of an atomic weight far beyond anything found in nature is to be built on the University of California campus, it was announced yesterday.

The machine—and another like it at Yale University—will cost \$1,200,000 and will be financed by the Atomic Energy Commission.

In theory, at least, the new machine will be able to add to the old periodic table of elements new artificial atoms with weights as high as 270 units or more.

BEYOND OLD LIMIT.

The highest natural element has an atomic weight of 238, but, working with other types of atom smashers, U. C. physicists already have fashioned man made atoms of weights ranging up to 254 units.

The new machine, which is expected to go far beyond this limit and which may produce atomic monsters of unknown behavior, is of the type known as a linear accelerator.

While most atom smashers speed their particle bullets around a circular track before diverting them to strike against a target, the linear accelerator shoots its bullets down a long, straight gun barrel, with each bullet riding the crest of a micro-wave.

Stanford University already has in operation the world's largest linear accelerator, developing a potential energy of 1,000,000,000 electron volts. By contrast the new U. C. machine will develop only 200,000,000 electron volts.

TYPE OF BULLET.

The major difference between the two machines lies in the type of bullet used.

The Stanford linear accelera-

tor propels electrons, the atomic particles that whirls around the nucleus of the atom, like planets around a sun.

The new machine will use neutrons, protons and alpha particles, all components of the atomic nucleus.

In this respect, the U. C. linear accelerator will be like conventional atom smashers—except that where most circular machines use the nuclear bits of the lightest elements, like hydrogen and helium, the new gun will use those from such heavy elements as carbon, oxygen, aluminum and silicon.

The difference is like a contrast between a .22 and a 30-30 rifle.

ANYBODY'S GUESS.

The designers of the new machine agree that what happens when these projectiles are shot into uranium and thorium, the basic targets, is anybody's guess.

The resulting artificial elements are certain to be heavy beyond anything ever seen before and they may be extremely freakish.

Working with the lighter "caliber" bullets, University of California scientists already have produced seven elements heavier than the heaviest of the standard, naturally occurring element, uranium.

But in the case of each new element, it has been a job of working up notch by notch, adding a particle here and there and letting one element revert to another through instability.

The new machine—it is expected—will permit the fashioning of new and heavier elements in relatively large leaps.

The new machine will be 108 feet long and seven feet in diameter.

Nuclear Energy Future Bright ^{St. Peter} Gazette

Nuclear energy will constitute an appreciable source of power within the next two decades, Dr. Glen T. Seaborg, one of the world's leading atomic scientists, told 153 Gustavus Adolphus graduates at commencement exercises at St. Peter, Minn.

Seaborg, chemistry professor at the University of California and a Nobel Prize winner, said nuclear energy would best be used in stationary structures. He said at first it probably would be used in the more remote power-starved areas of the world, because of high power costs. 5/31/54

St. Paul Pioneer Press Gustavus Grads Hear A-Scientist

ST. PETER, MINN.—^{5/31/54} Nuclear energy will constitute an appreciable source of power with the



Seaborg

next two decades, Dr. Glen T. Seaborg, one of the world's leading atomic scientists, told 153 Gustavus Adolphus graduates at commencement exercises here Sunday.

Seaborg, chemistry professor at the University of California and a Nobel prize winner, said nuclear energy would best be used in stationary structures.

Seaborg predicted that "as a result of the fast pace at which science is moving today, the next 50 years will bring the most amazing development of science."

The scientist was one of four persons upon whom the school conferred honorary doctor degrees. Others honored were W. O. Swanson, Omaha businessman, doctor of humane letters; Benjamin E. Youngdahl of Washington university in St. Louis, doctor of law and Rev. Anton M. Lundeen, Cokato, Minn., doctor of divinity.

Relatives and friends of the 1954 graduating class and of Gustavus Adolphus College packed Myrum Hall on Sunday, May 30 to witness ceremonies that lasted from 3:00 to 5:00 p. m. The weather was ideal for comfort and photography, except for a brisk breeze which gave the stand-ard-bearers in the procession all they could do to keep the flag-staves from blowing out of their grasp.

The procession was impressive. Headed by Marshalls, George W. Anderson and Milton Anderson, resplendent in their red caps and gowns, the vanguard of the line was made up of the President, and other top officials and visiting dignitaries. Next came the faculty, in order of their service and seniority, the class following from Ahlgren to Wiemann. At the entrance to Myrum, the faculty formed a double line, through which the graduates marched to "Tannhauser," played by the Symphony Band. After that the teachers again formed in double-breasted marching order and took their places on the stage.

Outstanding in the exercises of the day was the address by Dr. Glenn T. Seaborg, professor of chemistry in the University of California. Departing from traditional oratory and eloquence, Dr. Seaborg, striking by way of his Lincolnesque figure and manner, chatted with the graduates with reference to nuclear energy and its significance to the near and distant future. He declared this present-day scientific discovery to be the greatest event that has happened in human history since the discovery by mankind of fire.

Assuming more the manner of an entertaining class-room lecturer than that of the platform orator, Dr. Seaborg held in his hand a cube of uranium of only an inch in dimension while he traced the history and development of the new discoveries from the first theories of Albert Einstein in 1905 down to the present day, graciously omitting his own important contributions for which he received the Nobel Prize in Chemistry.

He then astounded the non-scientific portion of the audience by pointing out the possibilities of this great source of power: its use in exploring life-processes; its great potentialities in physical and mental therapy and in the increase of our life-span, besides the more workaday application to such matters as power and transportation.

On the latter score he declared that from a few thousand pounds of uranium and its by-products could be generated sufficient power to meet all the energy requirements of the United States, and that through new discoveries the most long-lived members of the class may see inter-planetary transportation not a dream but a fact.

Next he dealt with the many problems attending the harnessing of this new genie and deplored our national shortage of scientists and engineers. The possibilities of this new forces

are endless, he declared, and he congratulated his young friends on living in an era so fraught with history-making potential as the present one. He ended his talk quietly, with no flourishing period. None was needed, for he had held his audience in rapt attention.

Prior to the awarding of degrees, Dean Conrad singled out



Dr. Glenn T. Seaborg
Commencement Speaker

two students for special commendation, Elizabeth Nylund of Sweden who made magna cum laude, specializing in English and Fred Sommers, who was able to walk to the platform for his degree after having been struck down with polio.

Two students received summa cum laude, Keith Malmquist and B. Jeanette Larson, the genial manager of the college book-store. Ten others finished with magna cum laude and twenty-three, cum laude. The one-hundred-fifty graduates then came forward by schools

and received their appropriate degrees.

Four honorary degrees were awarded on recommendation of the faculty: Doctor of Divinity to the Reverend Anton M. Lundeen, long-time missionary in China (presented by Dr. George Hall); Doctor of Humane Letters to Mr. W. O. Liljenstolpe Swanson, Omaha business man, social action liberal, and president of the Count Folke Bernadotte Foundation (presented by Vice-President Rufus Logan); Doctor of Laws to Dean Benjamin E. Youngdahl of the School of Social Service, Washington University, St. Louis (presented by Professor Paul Steen); and Doctor of Science to Professor Glenn T. Seaborg (presented by Dr. Arne Langsjoen).

David Johnson, president of the Class of '54 presented the class gift to the college: six hundred dollars to be used for paraments and vestments for the prospective college Chapel. It was a neat and effective presentation speech and indicated the wise choice of the class for the presidency.

Dr. Paul Allwardt presided at the organ during the singing of the hymns, and beautiful music was presented by the college organizations under directors Leo J. Christy of the Symphony Band and Eugene Casselman of the Gustavus Choir. Particularly touching to the audience, this writer thought, was the old hymn, "Children of the Heavenly Father," sung in the Swedish language.

The invocation was pronounced by the Reverend Marvin L. Richmond (Class of 1929) of Galesburg, Illinois, and the benediction by the Reverend Anton M. Chell (Class of 1927) of Kensington, Minnesota.

Thus our ninety-second commencement becomes college history. It is a notable class and it was a worthy graduation ceremony.—Eston Peterson.

Glenn T. Seaborg, Professor of Chemistry, recently took part in a series of events at the Gustavus Adolphus College, St. Peter, Minn. He participated in the United Nations Institute, an experiment in adult education. He also presented the Gustavus Adolphus College commencement address, and received an honorary Doctor of Science degree from the same institution.

On June 11 Professor Seaborg will present an invited address on "Synthesis and Identification of Chemical Elements" to the Chicago Section of the American Chemical Society.

On June 14 he will receive an honorary Doctor of Science degree from Northwestern University.

"The program so far is pretty thin. There has been talk about some of the big issues. But, in the manner of these meetings, those topics usually don't jell until the second day, at least."

The schedule for the PCC meeting calls for continued deliberations today, tomorrow and Thursday, as a matter of record.

Sportsmen Selected

The delegates did select Professor Glenn Seaborg, faculty representative from the University of California, and Wilbur Johns, athletic director at UCLA, to be its spokesmen in Chicago next week for the annual "conference of conferences" under sponsorship of the NCAA. Prime objectives of this meeting will be to seek "integration of enforce-

No petitions were submitted by athletes at either the University of Idaho or Washington State college. Those whose petitions were considered were:

Wendell Niles Jr., University of Washington—Sought another year of competition inasmuch as he took part in only two plays (extra-point conversion tries) in one season on combined frosh-junior varsity team. Application denied.

John Stanton, Stanford tackle—Asked waiver of PCC "progress rule," under which athlete must complete prescribed number of hours or obtain specific number of credits, inasmuch as auto accident kept him out of school from January, 1954, on. Application approved.

Fred Pierce, Southern California half-back—Asked another year of eligibility inasmuch as he competed only in 1953, opening game against WSC for three minutes, was injured, and played no more. Application approved.

Donald L. Smith, Oregon tennis player—Asked waiver of PCC rule that would have declared him professional for officiating in four games in kids' baseball league while junior in high school, for which received total of 38. Application approved in view of Smith's age and lack of knowledge at time of incident.

Ted Anderson, Oregon track man—Sought extra year of eligibility inasmuch as illness side-lined him after competing in three meets, one of them in conference, this spring. Application denied.

William Clemens, swimmer, and Arthur Stauffer, rugby player, Stanford—Asked restoration to eligibility after being ruled

out by own school for permitting pictures to be used in commercial advertisement in student daily. Applications approved, inasmuch as students involved received no money and had made what were considered thorough inquiries as to legality of action beforehand.

Leroy C. Campbell, Oregon end—Asked waiver of progress rule cited above, inasmuch as army service intervened between last varsity competition, in 1951, and return to school. Application granted.

Kent Hadley, USC baseball player—Sought eligibility reinstatement after disbarment because received expenses for trial with a professional team after his high school graduation. Application granted.

Albert Martin, Oregon track man—Petitioned for extra year of competition, even though he will be graduated this summer, because knee injury kept him out this spring. Application denied.

Eugene D. Murray, California golfer—Asked waiver of transfer penalty after entering Oregon State as freshman, then competing for two years at Portland State extension center. Application denied.

Ronald Evans, USC track man—Asked that competition on frosh track team after freshman calendar year had expired not be charged as varsity season. Application granted.

Howard Evans, Stanford—Asked for another season of competition, inasmuch as illness side-lined him for year after less than four innings of one game on junior varsity team. Application granted.

Spokesman Review 6/8/54 Minor Issues Keep PCC Meeting Busy

By BILL BONI

Some reasonably major issues are due for debate at the present spring meeting of the Pacific Coast conference at the Ridpath hotel. These include reopening for discussion the matter of spring football practice (on which the PCC has invoked a ban to start in 1956) and consolidation of the nine member schools into one league in basketball.

But none of the major topics came up for a major airing at the two sessions which occupied the coaches, athletic directors and faculty representatives yesterday. There was discussion, but all of it was preliminary. In the words of Prof. H. P. (Dick) Everest of the University of Washington, as he met with the press at the first conference yesterday evening:

"ment procedures" on such matters as subsidization of athletes, and to seek the cooperation of the conferences in establishing an NCAA public relations program that will present that organization's work in a constructive light, according to Everest.

PCC spokesmen for yesterday's press "briefing" on the day's work were Everest and conference commissioner Victor Schmidt. The latter ran down a list of 13 conference athletes, and gave the conference's action on the petitions submitted by these men. They included denial of another year of eligibility to Ted Anderson, northern division 440-yard champion for Oregon in 1953, and approval of another year of varsity competition for John Stanton, Stanford tackle who was forced to drop out of premedical school after an automobile accident last winter.

Chicago Tribune
**N. U. GRADUATES
TOLD VALUE OF
'MIDDLE ROAD'**

6/15/54
2,627 Students Hear

Robert Anderson

The way Americans conduct themselves in their everyday lives at home may have as much to do with the fortunes of democracy as costly measures in the international field, Robert B. Anderson, deputy secretary of defense, said yesterday.

He told 2,627 graduates at Northwestern university's 96th annual commencement in McGaw Memorial hall, Evanston, and 10,000 parents and friends that Americans should seek moderation in government, an interest in community problems from the the national level to the precinct, and live their religion.

"The real America," he said, "and its true greatness flows not from fiercely burning flames of extremists but from the warm, steady glow that springs from the fireside of a plain, industrious, and decent people whose patience and moderation, resolute adherence to the truth, and understanding have led them and their nation down a middle road."

Miller Awards Degrees

Dr. J. Roscoe Miller, university president, awarded degrees to candidates representing the university's 12 schools, the Northwestern University Traffic institute, and the schools of nursing at Passavant, Wesley Memorial, and Evanston hospitals.

Anderson received an honorary doctor of laws degree. Honorary degrees also were given to Glenn T. Seaborg, research chemist at the University of California; Bessie Louise Pierce, professor of history emeritus at the University of

Chicago; John Holmes, president of Swift & Co., and Lowell B. Mason, member of the federal trade commission.

Mason, who gave the valedictory address to the honorary graduating class at a luncheon in Scott hall on the Evanston campus, stressed the importance of fair and impartial trial by courts, including the presumption of innocence, the rule against hearsay, and the right to meet an accuser face to face.

Berklium, Uclanium, Etc.

THE NEWS, as it touches upon Ronnie Knox, a sophomore football player, is bound to jar and disfigure the public conception of the scientist, particularly the nuclear scientist, and above all the nuclear scientist who wins a Nobel prize by rearranging atoms.

That kind of man, to carry any conviction at all to the average TV viewer, must be a dedicated laboratory hermit, possessing an absent and one-track mind, not knowing what day it is or caring what's for lunch.

Young Knox has now booted that popular notion clear out of the stadium, not by design, but by transferring abruptly from the University of California at Berkeley to the University of California at Los Angeles. The trip was illuminated by charges and countercharges concerning how he got to Berkeley in the first place and why he went back to Los Angeles in the second place; there is a suspicion that somewhere en route a rule or regulation of the Pacific Coast Conference may have suffered outrage.

It may now devolve upon Dr. Glenn T. Seaborg to sift the matter—the same Dr. Seaborg who is Professor of Chemistry at the University of California and who discovered five transuranium elements, plutonium, americium, berklium, curium and californium.

It is not because the Knox recriminations are flying around like neutrons in a synchrotron that Dr. Seaborg's services may be in order; it is because this world's foremost nuclear chemist is the U. C. faculty representative to the Pacific Coast Conference—being something of a sports fan. He plays golf, sneaks away from the lab to watch baseball games, and is the kind of football enthusiast who sometimes sits in the end zone the better to watch the line play.

Whatever the outcome, the public will be indebted to Ronnie Knox for showing it a Nobel Prize winner on his day off. *S.F. Chronicle* 7/8/54

7/13/54

Dr. Seaborg, Nobel Prize Winner, Ishpeming's Most Distinguished Native Son

ISHPEMING — If it hadn't been for an Ishpeming native's scientific achievement in discovering Element 94, plutonium, the atomic energy program would never have been put in effect when it was.

Dr. Glenn Theodore Seaborg, Nobel prize winner and Ishpeming's most distinguished son, played one of the leading roles in the dramatic story of the development of the atomic bomb. The co-discoverer of five of the six new transuranium elements, Dr. Seaborg at the age of 42 already has achieved immortality in the annals of science.

Born April 19, 1912

The son of Mr. and Mrs. H. Theodore Seaborg (his mother was the former Selma Erickson), Dr. Seaborg was born in Ishpeming on April 19, 1912. His father was a machinist in an iron mine and his grandfather, John Eric, was an expert machinist in his native Sweden and, later, in Ishpeming. Dr. Seaborg's uncle, Henry Seaborg, today teaches machine shop in the Ishpeming High School.

The famous scientist received his bachelor of arts degree in 1934 from the University of California at Los Angeles and his doctor of philosophy degree from the University of California three years later. In 1951, he was awarded an honorary doctor of science degree from the University of Denver.

Discoveries Recounted

From 1937 to 1939 he conducted research in chemistry at the University of California. Dr. Seaborg was instructor in the department of chemistry there from 1939 to 1941, assistant professor from 1941 to 1945 and has been a full professor and director of chemical research in the world famous University of California radiation laboratory since 1945. From 1942 to 1946, however, Dr. Seaborg was on leave of absence to serve in the metallurgical laboratory of the University of Chicago and in 1947 he was Nieuwland lecturer at Notre Dame University.



GLENN T. SEABORG

It was while he was still a mere instructor that Dr. Seaborg helped discover Element 93, neptunium. In 1940, when he was only 28 years old, the brilliant scientist and his associates discovered Element 94, plutonium. The next year Dr. Seaborg's team found Pu-239, plutonium's fissionable nuclear energy isotope, which proved vital to the development of the atomic bomb.

Highly Honored

With other scientists, Dr. Seaborg later discovered U233, a fissionable isotope of uranium. He and his colleagues then went on to discover in 1944 two more elements, 95 and 96, named americium and curium, respectively. At the same time, they found significant radioactive isotopes of the two newest elements. (Altogether, Dr. Seaborg has figured in the identification of more than 100 isotopes.)

In 1949, the Seaborg team discovered still another element, 97, berkelium. The following year they uncovered Element 98, californium.

One Of 10 Outstanding Men

For his prodigious achievements in chemical and physical science, Dr. Seaborg has been highly honored. In 1951, when he was 39, he won the Nobel prize in chemistry,

perhaps the highest honor that can be accorded any scientist. Prior to that, in 1947, he was named one of America's 10 outstanding young men by the National Junior Chamber of Commerce. In the same year, he received the Award in Pure Chemistry from the American Chemical Society. The following year, he was the recipient of the John Ericsson Gold Medal, awarded by the American Society of Swedish Engineers. Dr. Seaborg received the John Scott award in 1953 in recognition of his work on the transuranium elements. It probably goes without saying that he holds a Phi Beta Kappa key.

Dr. Seaborg has served since 1946 on the Joint Committee on Radioactivity of the International Council of Scientific Unions. He was appointed by President Truman to membership on the nine-man general advisory committee of the Atomic Energy Commission.

Married on June 6, 1942, to the former Helen Griggs of Berkeley, Calif., Dr. Seaborg and his wife have four children. The family visited Ishpeming a few years ago on a summer vacation, at which time residents paid their own high tribute to their city's greatest citizen.

Idaho Falls Register

Nobel Scientist To Address Chemists in I. F.

IDAHO FALLS, IDA.—Dr. Glenn T. Seaborg, co-winner with E. U. McMillan of the 1951 Nobel Prize in chemistry, will address a dinner meeting of the Idaho section of the American Chemical Society July 22 at 8:30 p.m. in Rogers Hotel.

All interested parties are invited to attend the lecture dealing with "recent developments in heavy (transuranium) chemistry," said society leaders.

7/21/54

Dr. Seaborg received his A.B. degree from the University of California at Berkeley in 1937 and served as professor of chemistry at that school. He was co-discoverer in 1940 of the element 94 (plutonium), in 1941 of nuclear energy source PU-239, in 1944 of element 95 (americum) and element 96 (curium), in 1949 of element 97 (berkelium), and in 1950 of element 98 (californium).

From 1940 to 1950, Dr. Seaborg served as a member of the general advisory committee to the Atomic Energy Commission, and in 1946 was a member of the committee on radioactive constants of International Union of Chemistry. In 1949 he served as a lecturer at the Royal Swedish Academy of Science, Stockholm, and in 1947 was named by the U. S. Junior Chamber of Commerce as one of the nation's "10 outstanding young men." In 1942 he was also co-discoverer of the new fissionable isotope of uranium, U-233, through which it may be possible to use thorium indirectly for atomic energy purposes.

Famous Chemist To Speak Here

Idaho Falls Post Register

One of America's outstanding chemists will speak in Idaho Falls Thursday night.

He is Glenn T. Seaborg, co-winner of the Nobel prize in chemistry, co-discoverer of plutonium in 1940, and named by the U. S. Chamber of Commerce as one of America's "10 outstanding young men" in 1947.

He will talk to the Idaho Section of the American Chemical Society Thursday at 8 p. m. at the Rogers Hotel on "Recent Development in Heavy (Transuranium) Chemistry."

He is also co-discoverer in many other chemicals, including americum, curium, berkelium, californium and nuclear energy source, Pu-239. He has been a member of the general advisory committee of the AEC and is on the committee of radioactive constants of "International Union of Chemistry." 7/21/54

975
Personal

The Mining Journal

UPPER • MICHIGAN'S LARGEST • DAILY

(Associated Press Service)

Marquette, Mich. — Wednesday, July 28, 1954

(16 Pages)

Governor Pays Warm Tribute To Ishpeming At Centennial Banquet



At Governor's Centennial banquet Gov. Williams turns photographer and takes picture of Dr. Glen Seaborg, Ishpeming native who is one of nation's foremost atomic scientists. —(Mining Journal Photo.)

Cites Vital Role Of Iron In History

ISHPEMING — Governor G. Mennen Williams saluted Ishpeming in glowing terms, last night, as he spoke at a joint banquet meeting of the city's four civic clubs.

Both Williams and Dr. Glenn Seaborg, famed native son scientist, received standing ovations from the clubs, which also had as guests the Centennial Queen and Duchess and their court.

Gov. Williams received a "hard hat" as a souvenir, and a Centennial plate. "But no pasty", he noted.

The Governor, introduced by John Voelker, spoke, in part, as follows:

"It is good to be with you on this joyous occasion as we celebrate your centennial in one of the most magnificent communities in the land of romance and beauty.

"The romance I speak of is not the romance of the individual but the romance of a whole people who have devoted their boundless and tireless energies to the creation of a way of life—a way of life which has dramatized our democratic ideals to such a degree that our North Country has become synonymous with freedom and liberty.

The Mining Journal

UPPER • MICHIGAN'S LARGEST • DAILY

Marquette, Mich. — Thursday, July 29, 1954

Summary Of Nuclear Energy Principles Given By Dr. Glenn Seaborg

Dr. Seaborg Honored At Dinner

Nobel Prize Winner Talks At Dinner

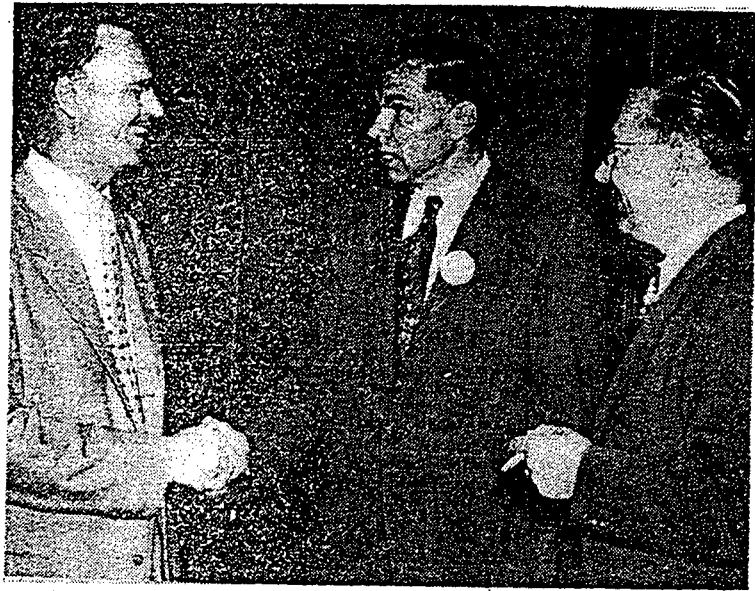
ISHPEMING — Dr. Glenn Seaborg, nuclear scientist who spent the first 10 years of his life in Ishpeming, held a piece of uranium ore between his fingers in a talk at a dinner in his honor at the Mather Inn Wednesday, and said that a lump this size, weighing but a pound, could provide heat, light, and electric power for Ishpeming for an entire month at some future date.

This forecast for the atomic age, while indefinite because of many engineering problems yet to be cleared away, took on added weight from the lips of the discoverer of plutonium, the man from whose laboratory have come enough key nuclear discoveries to make several scientists famous.

Before a "full house" of relatives, friends and representatives of educational institutions, Dr. Seaborg offered a brief summary of the principles of nuclear energy, and a thumbnail sketch of his connections with Ishpeming.

Traced Atomic Development

Dr. Seaborg traced the development of the "atomic" weapon which he more correctly describes as the nuclear weapon, from the days, 50 years ago, of Albert Einstein's theory about converting "mass" into energy, through the discovery of such energy developing through a chain reaction involving uranium, and through his laboratory's finding, that plutonium made it possible for all uranium, rather than 1-140th of it, could be used in the process.



Left to right—Ogden Johnson, Dr. Glenn Seaborg and Lloyd Holmgren chat at Mather Inn before the dinner given there in honor of the famed nuclear scientist, Nobel prize winner and Ishpeming native. —(Mining Journal Photo.)

He said the "atomic" power principle could one day be applied to any energy-using unit capable of carrying a one-ton power unit.

Of the bomb, which in its "H-Bomb" variety equals the explosive force of millions of tons of TNT, he said: "It would have been folly not to develop it, with world conditions as they are today."

Thorium Potential

Thorium, an element available in the Upper Peninsula, and another discovery of his laboratory, has a potential for long range development in the nuclear field, Dr. Seaborg said.

The Nobel prize winner was born on Division street, near the Brownstones, and later moved to Seventh and Wabash. His grandfather came to Ishpeming in 1867, and his mother came here from Sweden 50 years ago.

He said he had met many of his old playmates while here, and ~~had discovered~~ that Joan Larance, the Duchess of Ishpeming, for the Centennial, is the daughter of a friend of his sister.

A full professor, and head of the University of California radiation laboratory, Dr. Seaborg has, as an added task, been faculty representative for the University for the Pacific Coast athletic Conference.

He closed his talk by saying that broadening the base of research, through such projects as undertaken by the Dow Chemical company and the Detroit Edison company, would speed the development of the "atomic age".

Summary Of Nuclear Energy Principles Given

Thursday, July 29, 1954

By Dr. Glenn Seaborg

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Dr. Seaborg Honored At Dinner



Left to right—Ogden Johnson, Dr. Glenn Seaborg and Lloyd Holmgren chat at Mather Inn before the dinner given there in honor of the famed nuclear scientist, Nobel prize winner and Ishpeming native. —(Mining Journal Photo.)

The Nobel prize winner was born on Division street, near the Brownstones, and later moved to Seventh and Wabash. His grandfather came to Ishpeming in 1867, and his mother came here from Sweden 50 years ago.

He said he had met many of his old playmates while here, and had discovered that Joan Larmour the Duchess of Ishpeming for the Centennial, is the daughter of a friend of his sister.

A full professor, and head of the University of California radiation laboratory, Dr. Seaborg has, as an added task, been faculty representative for the University for the Pacific Coast athletic Conference.

He closed his talk by saying that broadening the base of research, through such projects as undertaken by the Dow Chemical company and the Detroit Edison company, would speed the development of the "atomic age".

Lewis, Seaborg Stress Importance Of Technology And Engineering

Atomic Pool Plan Outlined By Scientist

ISHPEMING — Assistant Secretary of the Air Force Roger Lewis and the famous nuclear scientist, Dr. Glen Seaborg, both stressed the importance of technology and engineering, in brief talks at a banquet honoring Lewis and other distinguished Centennial guests, Thursday night in the Mather Inn.

Toastmaster was Walter Gries, who revealed the fact that Dr. Seaborg was a fourth-grade student when he was principal at Grammar school.

The invocation was given by the Rev. Wayne Peterson.

Explains Eisenhower Plan

Dr. Seaborg reviewed current discussions on changes in the Atomic Energy Act of 1946 and President Eisenhower's plan of a world atomic resources pool. He pointed out that the problem of expanding atomic facilities into industry includes the protection of the public investment of some \$10 billion in U. S. nuclear work. He said that atomic work could not be entirely private enterprise.

He pointed out that the CERN laboratory was a Western European equivalent of part of the Eisenhower "pool" plan. He said the shortage of scientists and engineers was being felt in technological fields and that the Soviet Union, in answer to this problem, was expanding technological education.

Secretary Lewis revealed that his parents once owned a store in Oscoda, Mich.

U. S. Air Power Best

Lewis said that in four years the U. S. had regained a "military posture" in the air, with 115 of the sought-for 137 wings in the Air Force.

Two Famous Persons Meet



"Miss America", shortly after her arrival at Mather Inn, chats with Dr. Glenn Seaborg, famous nuclear scientist, at banquet given in honor of Roger Lewis, assistant Air Force secretary, principal speaker at Centennial homecoming picnic. —(Homburg photo.)

He said that the American technical reservoir and competitive spirit "turn the balance in our favor," despite Russian numbers and lack of morals. He said that competition, capability and energy, not money, were the key factors in keeping American air power "ahead."

Congressman John B. Bennett, who attended the Homecoming picnic during the afternoon, was called home because of the serious illness of his father.

Visiting Our Home Town Called 'Heaven'

Tribune Editor Attends
Centennial of His
"Old Home Town"

By O.B.A.

We just recently returned from "heaven". And of course when we use that term, it must be explained. Ishpeming, in the northern Peninsula of Michigan, is a Chippewa Indian word and it means "the distant land on high" or "heaven". In the early aboriginal days the Chippewas inhabited that region but they stayed shy of the iron ore "mountains" which they saw at Ishpeming. Somehow they thought that this iron was some sort of a celestial manifestation and they seemed afraid to pitch their tents in the area.

Well—it was there where we spent a most happy week recently at our birthplace, and attended a grand Centennial celebration. For going back to the old home town it did seem a bit like "heaven", just as the birthplace of all you readers has so much of charm and memories for you—the place where you played as a child, the recollections of your old home. For us to be up there among those hills, forests, lakes and streams was a pleasure which only comes to one who was born there. The area is mostly all timber land, with the cities nestled among the woods and bluffs—in fact you don't have to go very far from your front door before you are "out in the wilds."

And what a celebration it was—such as most any city will put on when 100 years of existence is observed. Such an occasion really deserves a real festivity and everyone pitches in to do his part. They even closed all the mines for the whole week so everyone could take part.

The five Augustsons, Ann, O. B. and Gordon of Willmar and Edward and Rudie from Detroit were housed in a cottage near beautiful lake Michigamme near Ishpeming and here we could come and go without imposing on relatives or friends. This cottage was acquired for us thru the kindness of Jim Flaa, one of the most enterprising citizens of Ishpeming.

The city was gaily decorated, men in whiskers and beards were seen everywhere—the banker and the miner had grown them the past six months, the ladies were dressed in the "Gay Nineties" styles, including bonnets. And during the afternoons and evenings we met all these folks as they congregated downtown where many blocks were roped off for the throngs. Here we met the older residents, folks we had grown up with and who still lived in the iron mining city. But the greatest pleasure was to meet others, like ourselves, who had come back to the old home town for this 100th year celebration. They came from all over the United States—it is estimated that perhaps a full thousand former residents returned to the home town for the great event. And we met so many of them—some we had not seen for 30 or more years—sure, time had changed them, like ourselves—but what happy moments we had exchanging memories.

We saw two fine parades, a lovely one by the children with so many novel ideas in costuming and little floats and then the big Centennial parade that was fully 3 miles long and took three hours to pass the reviewing stands. Practically every city in the northern Peninsula had an entry in the parade.

Every evening an historical pageant was presented by a home cast of several hundreds at the community stadium. It was called "Centurama" and dramatically told the history of the city. Thousands saw the production each evening and each performance closed with a fine display of fireworks.

Then there was the great home coming picnic at the Winter Sports Arena near the city. This Winter Sports Arena is a great tourist attraction thruout the winter. Here you find ski slides, toboggan slides, tows to take you up to the top after the ride down, ski trails thru the woods. Chicago and Detroit folks come up there every winter to spend several weeks enjoying themselves, bringing much income to the city, in addition to the tourist revenue during the summer.

The home coming picnic was a huge event—it is estimated that 5,000 people were on the grounds and again you met a lot of people you had not seen in years. On the program were governors and other dignitaries. Why, they even had a ski race—yes—a ski race. They had built a special slide and covered it with truckloads of crushed ice. Star riders from Ishpeming, famous as the ski riding capital of the nation, went down the slide and jumped 50 and 60 feet but they had to be mighty careful they did not fall as the hot sun soon melted the ice or they could fall when their skis ran on the grass.

Oh yes, there was a snowball fight too. Trucks of crushed ice poured two piles at each end of a certain space and the kids had a lot of fun throwing snowballs at each other.

Talking about famous people being there—we had the pleasure of meeting Miss America and also Miss Michigan. We were privileged to attend a banquet at beautiful Mather Inn hotel where we met these beautiful, charming and talented girls.

Present also was Dr. Glenn Seaborg, noted nuclear scientist, who was born in Ishpeming and therefore that city's distinguished son. He spoke on several occasions.

One of the very interesting delights was to see all the old pictures and relics of by-gone days. In most every store window you saw them—folks had dug away in their attics and brought out hundreds of these interesting items and you spent hours looking at them in the windows.

Did we go out into the woods? Of course, we could not miss that chance to get out among the high hills where as a lad we picked those blueberries and fished trout. Here you were out in a glorious wilderness where bear and wolves abound and where you are real close to Mother Nature. We picked enough berries for a pie or two.

Naturally we were invited out for dinners and evenings by friends and relatives. One of these was at the home of our old pal Oliver Lindberg and sister-in-law Agnes Augustson where we were royally entertained. Another was a treat of those "pasties"—that Cornish dish which is a

whole meal wrapped up in one crusty package. Delicious—you should taste one of them. The pasties were made by our former neighbor Mrs. Helen Markert and she really can make them. Mr. and Mrs. Markert also celebrated their 40th anniversary and we took part in the program with a short talk and two songs by the 4 Augustson brothers doing a little "barbershopping".

Naturally we looked up members of our High School graduating class of 1916 and the most pleasant of such visits was to the home of Mrs. Phil McKeown who now resides at Republic a town not far from Ishpeming. We had not seen Frances since school days. She had a little time recognizing us and altho she is not Swedish, she soon had the coffee pot on and between sips we talked and talked about our school days.

We also visited several of the mines, especially the multi-million-dollar Mather mine the largest underground iron mine in the world. We also played a round of golf on the old course where we used to be a caddy at 10c a round.

Well—it was a most pleasant week that we will never forget. Some day Willmar is going to celebrate its 100th anniversary and we know that it will be a real affair. And those former Willmarites who will be coming back here will have the same thrill which we enjoyed. There is something that warms the heart and tugs at those heart-strings when you come back to your old home town again—a place so precious in memories when Dad and Mother and "the brood" lived in the old home which was so humble but rich in so many other ways.

Cliffs News

THE CLEVELAND-CLIFFS IRON COMPANY



Dr. Glenn T. Seaborg describes atomic energy.

ILLUSTRIOUS NATIVE SON RETURNS

Dr. Glenn Theodore Seaborg, accompanied by his father and mother, returned to Ishpeming during Centennial Week, when a testimonial luncheon was given in their honor. Seaborg's father was employed by the company as a machinist until 1923 when the family moved to California. Dr. or Professor Seaborg—he is a full professor of chemistry and director of nuclear chemistry at the University of California, co-discoverer in 1940 of element 94 (plutonium), in 1941 of nuclear energy source isotope Pu-239, in 1944 of

element 95 (americium) and element 96 (curium), in 1949 of element 97 (berkelium) and in 1950 of element 98 (californium)—has been named one of America's ten outstanding young men, and in 1951 with Dr. E. M. MacMillan was given the Nobel Prize in chemistry. Seaborg sees atomic energy, of which he was one of the co-discoverers, a great force for world advancement in scientific and medical uses, counter-balancing the terrifying, destructive power of plutonium.

OCTOBER 23, 1954

L.A. Times

Atomic Navy Seen for Next Decade

But Noted Nuclear Chemist Says Such Power for Autos Is Doubtful

BY WILLIAM S. BARTON

The United States Navy may be propelled by atomic engines within 10 years. Large airplanes may be similarly propelled but it is unlikely that automobiles ever will be run by atomic power.

Failure to improve techniques for disposal of dangerous waste products may limit the widest development of atomic plants to generate electricity.

These are among the conclusions of a Nobel Prize winner, Dr. Glenn T. Seaborg, noted nuclear chemist of the University of California. The codiscoverer of plutonium, the substance employed to blast Nagasaki and end World War II, addressed a special meeting of the Bond Club yesterday in the Biltmore.

Sees Atomic Navy

"I feel," he said, "that it is entirely possible in the course of 10 years to reach the place where very few new capital ships will be launched without the inclusion of nuclear power plants. In fact, with the recent commissioning of the submarine Nautilus, and the well-advanced plans for its sister submarine, the Sea Wolf, great progress already has been made in putting nuclear power into submarines.

"It is well to remember that the presence of radioactive rays makes it necessary to surround nuclear reactors with large quantities of shielding material for protection. Therefore, nuclear energy devices should be used first in areas where other forms of energy are not readily available.

Not for Autos

"It will never be possible to use these devices for the propulsion of ordinary automobiles because of the weight of shielding material, but it certainly will be possible to use atomic power for boats and even for large airplanes. Nuclear energy will be well suited for stationary structures.

"Most of us admit that it is too soon to say whether nuclear energy will be able to compete in cost with other forms of energy, such as coal. Some competent engineers think it's possible for atoms to produce electricity at an over-all cost of 6 to 7 mills per kilowatt-hour of energy. This is comparable to costs with present methods. However, some engineers feel this is too optimistic.

Importance Sure

"It should be emphasized that nuclear energy will be important regardless of the eventual outcome of the cost situation because of its concentrated form and thus its possibility of doing things no other energy can do at any price. There already is a certainty that a nuclear energy industry will develop.

"Waste disposal may be the key to the whole future of atomic power. It now is the chief limiting factor. Hauling this waste miles to sea and dropping it in kegs of cement is just too expensive.

Dr. Glenn Seaborg told the World Affairs Council of Northern California, meeting at Asilomar, that the United States still leads all countries in industrial applications of nuclear energy. Page 7.

Educational Exhibits Are Open to Public

Civic Auditorium, scene of the regional convention of the American Association of School Administrators, is filled with educational exhibits that are open to the public.

The exhibits include the latest in textbooks as well as such things as special air conditioning systems for schools.

Industry Role Seen

"Of particular importance in the future of nuclear energy in the field of industrial power is the new program of greater participation by private industry. This has been made more feasible as a result of the recent revision of the atomic energy law. Under the new law, these restrictions have been largely removed and industry now has the right to use fissionable materials, the right to own and operate nuclear reactors, and a certain amount of right to patent inventions and discoveries."

The speaker explained that the present fuels for atomic engines include plutonium, Uranium-235, and Uranium-233, the latter being made by bombarding thorium.

"But," Dr. Seaborg concluded, "it will take time for us to learn whether this new control over the atom more greatly serves mankind and the forces for good than it serves evil."



VAD ÄR DE FÖR? Det är familjen som besödar Pär Lagerkvists diplom från vänster äldsta sonen Ulf, Pär Lagerkvists maka Elaine, Ulf Lagerkvists syster Eva — dotter till The Svedberg — yngste sonen Bengt samt dottern Elin.

den 24 November 1954

Atomvisning på svenska för Erlander vid Frisco

Från DN:s utsände medarbetare Sven Ahman

SAN FRANCISCO, tisdag.

Nu är juvelöggen räddad hemma hos Erlanders. Tillsammans med sina norska och danska kolleger tillbringar statsministern tisdagen på flygfärd tvärs över den amerikanska kontinenten till Washington, och i hans bagage ligger en jättkartong russin. Den fick han i present då han passerade Kallifornienstaden Kingsburg, som är nästan helt befolkad med svenskfödda russin- och persikodalar som med hänsyn och blomma gick man ur huse för allt uppvaktat.

Under sin sista eftermiddag i Kalifornien avlade Erlander ett improviserat besök i atomlaboratoriet i Berkeley tvärs över bukten från San Francisco räknat. Med den svenska Nobelpristagaren Glenn Seaborg som ciceron fick han bese den välgångna nybyggda bevakningen, vars finster Seaborg delvis förklarade på svenska. Erlander blev så intresserad att han i sin tur med ledning av sin nyvunna kunskap började förklara den mäktiga maskinen för svenskar i sällskapet, som räkat litet på efterkälken. Seaborg meddelade statsministern att fler forskare från Sverige besökt Berkeleys atomlaboratorium än från något annat land och att regerandet utbytte av folk med Nobelstiftet i Stockholm nu har lett.

Erlander passade också på att besöka universitetets bibliotek och bese dess skandinaviska avdelning, som genom två donationer av ingenjör Hirsch på Nordiska bokhandeln och Ake Eunnier nyligen fått ett respektabelt tillskott av svensk skön- och facklitteratur. Avdelningens chef, professor Assar Janzen, fick löfte om statsministerns hjälp för sina samlingars ytterligare förkovran.

Kalifornienbesökets slutverksamhet blev ett skandinaviskt massmöte på San Francisco-operan, där Förenta nationerna på sin tid bildades, ett lyckat motstycke till den fest i Pasadena som i fredags avslutade ministrarnas vist i Los Angeles. Det hade befarats att publiken skulle utbil, men när det kom till kritan var operationens över 20000 platser nästan helt besatta med en publik som tacklöst applåderade både det nordiska musikprogrammet och de gästande statsmännen, anföranden. De vinnytjade i huvudsak ånyo sina manuskriften från Pasadenafesten med

Bohemian Club, given av Bank of America, den amerikanska bankens (medan Torp besåg Amundsens byst, som finns uppställd i stadsparken, och Hedtofts bänkade sig i stadens danska klubb. Vid lunchen för Erlander, som bevidnades av ledande lokala affärs- och finansmän samt en rad framstående svenskättlingar, däribland Nobelpristagaren Glenn Seaborg, underströk statsministern särskilt vikten av att den amerikanska tullpolitiken blir stabil, så att utlandet vet vad det har att räkna med. I kväll talar ministrarna i samband med ett nordisk festkonstert på stadsoperan.

tillägg av nyinlagda reverenser för San Francisco — inklusive förhoppningen att SAS:s polarflyg så småningom får mellanlänka där.

Efteråt följde en massupväkning för ministrarna av de skandinaviska kolonierna i det närbelägna Konstmuseet med handskakning och champagnebål på löpande hand. Museet råkar just ha en specialutställning över normannen Per Krohgs målari, och i den miljön fick normannen Torp hälsa norskamerikanerna, medan Erlander och Hedtoft röjde silt i angränsande museihall.

Erlander i kinesstaden

Vid ankomsten till San Franciscos flyghamn hälsades ministrarna av stadens borgmästare Elmer Robinson och nationalklädda flickor, som hängde på dem doftande blomsterkransar i Hawaii-modell i deras respektive hemlands färger. Erlanders kranskulla i Smålandsdräkt symboliserade själv den amerikanska smältdegen, ty hon bar det spansk-tyska namnet Ramona Kuhnle och kunde inte ett ord svenska. Hon är dotterdotter till den avlidne pressveteranen Alex Olson, mångårig redaktör för den svenska San Francisco-tidningen Vestkusten.

Erlander begagnade söndagskvällen till att bese San Franciscos pittoreska kinesstad, och under en längre juristtur i förmiddags besökte statsministern bl. a. den traditionsrika Wells Fargo Bank, besåg utställningen med kaliforniska kulturkuriosa, däribland den guldspik varmed järnvägslinjerna från Stilla havet och Atlanten på sin tid sammanknöt. Han begagnade också tillfället att göra en hisnande berg och dälbanefärd med de kabbelvagnar som trösklar San Franciscos enorma backiga gator.

Erlander försökte att reparera skadan från presskonferensen genom att understryka de nordiska ländernas förhoppning och förtrostan på att Eisenhowers vidare handelspolitik skall vinna ett amerikanskt stöd då han senare talade vid en lunch på

Berk. Gazette
**Cheap Atom
Power Seen**

1/24/55
Dr. Glenn T. Seaborg, professor of physics at the University of California, believes that development of cheap nuclear power is on the way—and a good thing, too.

Seaborg, a Nobel prize winner, told a dentists' meeting in San Francisco that "it now looks as if it will be possible to produce (nuclear) industrial power for six mills per kilowatt hour.

"This would be comparable to present costs for other fuels," he said.

He said development of a practical nuclear fuel is of vital importance.

"By 1975, our supply of fossil fuels, coal, oil and gas—will dwindle to a point where we must have a new source of energy," he said.

Seaborg said the two biggest problems to be solved before this power becomes readily available are the disposal of radioactive wastes and greater control of the chain reaction.

He predicted that most large naval ships will have nuclear power plants within 10 years, but he saw no immediate prospect of atom-powered autos, planes or locomotives "because the radiation shielding makes necessary a 50 to 100-ton power plant."

Approximately 500 dentists attending the fifty-ninth annual meeting of the Alumni Assn. of the University of California College of Dentistry heard Seaborg speak.

Atomic Powered U.S. Navy
Predicted Within 10 Years

Most naval vessels will be atomic-powered within 10 years, according to Dr. Glenn T. Seaborg, Nobel prize winning professor of physics at the University of California.

Dr. Seaborg told some 500 delegates to the 59th annual meeting of the Alumni Association of the University of California College of Dentistry yesterday that atom-powered planes, autos or locomotives are not likely to be built in the near future because "radiation shielding makes necessary a 50 to 100 ton power plant."

Speaking of atom power for industry, Dr. Seaborg said "It looks as if it will be possible to

produce this industrial power for six mills per kilowatt hour. This would be comparable to present power costs with other fuels."

DEVELOPMENT VITAL

He said development of new fuels is vital because by 1975 "fossil fuels—coals, oil and gas—will dwindle to a point where we must have a new source of energy."

The two big problems blocking immediate use of atomic power for industries are disposal of radioactive wastes and greater control of the chain reactions, Seaborg said.

The physicist also told the delegates the radioactive by-

products of nuclear research used in medicine "may be of more benefit to humanity in the long run than the development of industrial power."

In another talk before the convention, Dr. J. Eugene Ziegler of Los Angeles said that, with a proper diet from birth, people should be able to use their own teeth all through their lives, barring accidents.

U. C. ALUMNI
DENTAL MEET
OPENS TODAY

Teeth Problems of Aged
To Be Discussed

S.F. Examiner 1/23/55

Dentistry for those of advanced age will be discussed at the two day convention of the University of California Dental Alumni Association opening today at the St. Francis Hotel.

Dr. John Creech, president-elect, said the meeting will emphasize the large number of elderly persons in California and the longer life span.

SPEAKERS LISTED.

Dr. Eugene Ziegler of Los Angeles will speak on the effect of diet and nutrition on the elderly, and report on the role of psychology in the fitting of bridges and dental plates will be given by Dr. Arthur W. Schultz of Los Angeles.

The effects of dentistry on personality rehabilitation will be discussed in a report to be submitted by Drs. D. J. Potter of San Francisco, Don Fraser of Livermore, and Edward Rutledge and Don Bale, both of Richmond.

Subjects of papers to be presented range from how to prepare silver amalgam for filling a cavity to the engineering principles involved in designing a dental bridge.

SYMPOSIUM SET.

A symposium on emergencies that may confront a dentist will be conducted by Drs. George J. L. Riba, Mortimer A. Benloff, Roger H. L. Wilson and Seymour M. Farber, all of the University of California.

The speaker at the luncheon today will be Dr. Glenn T. Seaborg, professor of physics at the University of California.

S.F. Examiner 1/24/55

Diet's Effect on Teeth Told at Dental Meeting

S.F. Chronicle

Expert Looks At Future of Atom Power

1/24/55

Most large naval vessels will have nuclear power plants within ten years, Dr. Glenn T. Seaborg, professor of physics at the University of California, predicted yesterday.

Seaborg, a Nobel prize winner, said, however, that there was no immediate prospect of atom-powered autos, planes or even locomotives, "because the radiation shielding makes necessary a 50 to 100-ton power plant."

The famous physicist was extremely optimistic about the development of nuclear power.

"It now looks as if it will be possible," he said, "to produce this industrial power for six mills per kilowatt hour. This would be comparable to present power costs with other fuels."

TWO KEY PROBLEMS

The two biggest problems to be solved before this power can become available are the disposal of radioactive wastes and greater control of the chain reaction, according to Seaborg.

He called it "unfortunate" that the first demonstration of the harnessing of nuclear energy should have been in the form of a weapon.

The goal of present research, according to Seaborg, is such complete control of the chain reaction that "the energy can be released within anywhere from a millionth of a second to a period of years."

The development of a practical nuclear fuel is vital, "because by 1975 our supply of fossil fuels—coal, oil and gas—will dwindle to a point where we must have a new source of energy," he said.

AMPLE MATERIAL

There is enough fissionable material available to replace these fuels, he said. The problem is to use them efficiently. If all the nuclei in a one-pound piece of uranium were used in fission action, the pound would release heat equivalent to 10,000 kilowatt hours, or 2000 tons of coal, Seaborg said.

Proper care and diet will assure good teeth for a lifetime, some 1,000 dental alumni of the University of California were told yesterday by three guest speakers.

The occasion was the opening of the fifty-ninth annual meeting of the dental school's alumni association at the St. Francis Hotel. The sessions, on a "Dentistry for the Elderly" theme, will end today.

Dr. J. Eugene Ziegler of Los Angeles, said, "With an adequate diet from birth, one should have a good dental machine throughout life, barring accidents."

DIET SPECIFIED

This diet, he specified, should include proper amounts of proteins, minerals and vitamins with sufficient carbohydrates and fats. The carbohydrates, Doctor Ziegler warned, should not be in the form of concentrated sweets, such as candy.

With life expectancy now up to 68 years as compared to 1900's 49 years, he declared, regular care of teeth takes on increasing importance.

Dr. John H. Mosteller of Mobile, Ala., asserted that silver amalgams make the best fillings for cavities in teeth of elderly patients. He added:

"There is no doubt but what amalgams did save literally millions of teeth during World War II when it was practically the only material we dentists had."

The radioactive by-products of nuclear research used in medicine "may be of more benefit to humanity in the long run than the development of industrial power, great as that benefit is," he said.

Seaborg spoke yesterday at a luncheon in the St. Francis Hotel's Mural Room, the 59th annual meeting of the Alumni Association of the UC College of Dentistry.

WAR'S IMPACT.

Doctor Mosteller said the war had a considerable impact on the field of dentistry for the future. He explained:

"Millions of young people learned to appreciate dentistry while in service. Previously—and to some extent among the older people now—dentistry was looked upon by many as a luxury.

"Far more individuals now recognize the value of preventive dentistry. After all, we may be very proud to fit a patient with a fine set of dentures but it is much better to prevent the loss of teeth nature gave him."

Dr. Arthur W. Schultz of Los Angeles emphasized that successful fitting of dentures requires that the dentist understand his patient's temperament.

This is especially important, he said, in handling elderly people who are having their teeth replaced for the first time.

NEW PRESIDENT.

Dr. Glenn T. Seaborg of the University of California, discussed "Peacetime Uses for Nuclear Energy" at yesterday's luncheon meeting.

Doctor Seaborg, a Noble prize winner in chemistry, predicted that most large naval vessels will have nuclear power plants within ten years. But he said that automobiles, planes and locomotives could not be atom powered because radiation shielding demands a 50 to 100 ton power plant.

Industrial use of nuclear power is highly feasible, he pointed out, because the power can be provided at a cost comparable to present power costs with other fuels.

TO INSTALL PRESIDENT.

This morning Dr. John W. Creech of Berkeley will be installed as the association's president, succeeding Dr. Don Parle White, also of Berkeley.



SIX NOBEL PRIZE WINNERS, all professors at the Berkeley campus are, left to right: Edwin M. McMillan, physicist; William F. Giaouque, chemist; Glenn T. Seaborg, chemist; John H. Northrop, bacteriologist; Wendell M. Stanley, biochemist, and Ernest O. Lawrence, physicist. These scientists constitute the second largest congregation of Nobel prize winners on a single campus.

Six Nobel winners

Berkeley's scholars honored

By MARILYN JACOBSON
Daily Californian Managing Editor

They say education is a funny thing; most people want it but few know what to do with it.

At the Berkeley campus there are many outstanding men and women who have devoted their lives to research and teaching in the everlasting search for the meaning of higher education.

Many of these scholars have achieved distinction within their own fields; some have won the highest honors awarded.

Perhaps the most well known of these awards is the Nobel prize, established for the purpose of rewarding men for intellectual achievement in the fields of physics, chemistry, medicine, literature, and international conciliation.

ADDED DISTINCTION

The Berkeley campus has the added distinction of being second only to Harvard university in the number of Nobel prize winners on the faculty.

On this campus there are six such honored men: William F. Giaouque, professor of chemistry and chemical engineering; Ernest O. Lawrence, professor of physics and Radiation laboratory director; Edwin M. McMillan, professor of physics; John H. Northrop, professor of bacteriology; Glenn T. Seaborg, professor of chemistry and chemical engineering; and Wendell M. Stanley, professor of biochemistry and Virus laboratory director.

Lawrence, who in 1939 was the recipient of the physics award, was the first man from the University to receive the Nobel prize, and the first to have conducted his entire research project here.

His contribution to the world and science is the atom-smashing cyclotron, which he first started to work on in 1930.

Seven years later, Stanley and Northrop shared the prize in chemistry with James B. Sumner. Stanley is known as the pioneer in the chemistry of proteins and won his award for the crystallization of the first proteolytic enzyme, pepsin.

Study which led Northrop to his award was his isolation for the first time of a virus in pure crystalline form.

UNIVERSITY GRADUATE

Giaouque, who received his award in 1949 in chemistry, attended the Berkeley campus, entering as a freshman in 1916; in 1922 he joined the faculty. His contributions to the field of low temperature research in which he devised a technique for studying temperatures only a few thousandths of a degree above absolute zero earned him the Nobel prize.

Most recent of the Nobel laureates from this University are McMillan and Seaborg. Winners in 1951, they showed the unification between physics and chemistry in the nuclear sciences. As a team, they were responsible for the discovery of elements 93 through 98, which opened up the atomic era.

Here are six men who have made contributions to mankind — their standards of research and education did not go unnoticed.

S.F. Chronicle
**Seaborg Asks
More 'Basic'
A-Research**

By HENRY PALM *4/6/55*

Failure of the United States to recognize fully the value of basic research in science has delayed progress of our atomic energy program, a Nobel prize winner told a group of industrialists and scientists here yesterday.

A plea for more funds and emphasis on basic science was made by Dr. Glenn T. Seaborg, professor of chemistry at the University of California and one of the discoverers of plutonium.

He was the main speaker on the last day of a conference on atomic energy at the Mark Hopkins Hotel sponsored by Stanford Research Institute and Atomic Industrial Forum of New York.

5% FOR RESEARCH

The Government, industry, universities and non-profit institutions are currently spending about \$3,000,000,000 a year on research, but less than 5 per cent of this is on basic research. Funds for basic research could very profitably be doubled, Dr. Seaborg said.

Man is still comparatively ignorant of the many forces in the atom, and only basic research can remedy this, he said.

The development of reactors for production of energy, a matter of extreme importance to the future, is limited because no one knows of a practical way to dispose of radioactive waste from the reactors, he warned by way of example.

Dr. Seaborg also asked for better education of the public in science.

ENOUGH URANIUM

Another speaker, Jesse C. Johnson, director of the Division of Raw Materials of the Atomic Energy Commission, said we now have adequate supplies of uranium to meet foreseeable military and industrial requirements.

George F. Trowbridge, Washington, D. C., attorney, told the group that industry may have some conflicts with the Atomic Energy Commission in private development of atomic power.

"Industry will have to be aggressive, ingenious and patient in order to get the information from the AEC that Congress intended it to have," he said in a discussion of the Atomic Energy Act of 1954.

Charles F. MacGowan, international representative of the International Brotherhood of Boilermakers, Iron Shipbuilders and Helpers of America, AFL, spoke of the impact of atomic energy on labor.

His union, he said, is already planning new apprentice training programs to provide the new skills necessary in atomic energy plants.

Dr. Seaborg: 'U. S. Needs Scientists'

S.F. Chronicle 4/6/55

A fervent "Help Wanted" ad to help fill America's future scientific openings was delivered last night to the Secondary Education Board, representing the Nation's private schools, at the Hotel St. Francis.

The advertiser, a Nobel Prize-winning scientist is the University of California's Dr. Glenn T. Seaborg.

Seaborg foresaw a bleak future as the Nation grows more and more dependent on science — and less and less able to supply enough science-trained college graduates.

He blamed the shortage of scientific graduates on the shortage of proper science courses in high schools and grade schools.

Finally, he foresaw no help until grade and high school teachers are attracted into their professions by, among other things, wages at least to those of "electricians, plumbers, auto workers and railroad conductors."

Meanwhile, he said, "the loss of potential scientists" continues to occur "in the pre-college years," because "the pre-requisite courses are not offered in enough schools," or they "are not popular" or are "improperly organized and taught."

More teacher pay, more math, more science, and sooner, were his suggestions "to check a complete breakdown in the quality of the education of our youth."

Atom Retractor Waste Peril Told by Seaborg

S.F. Examiner

By JOHN F. ALLEN

4/6/55

The one great unsolved problem which may severely limit the widespread use of atomic energy in a power-hungry world is the disposal of tremendous volumes of poisonous radioactive wastes from nuclear reactors.

This chilling observation was tossed yesterday by Dr. Glenn T. Seaborg, University of California Nobel Prize-winning chemist, into an otherwise highly optimistic discussion of atomic power production.

Doctor Seaborg spoke before a luncheon meeting of an atomic energy forum, sponsored by the Stanford Research Institute, which closed yesterday at **NO METHOD FOUND.** the Mark Hopkins Hotel.

In the face of predictions that in the course of two decades or less atomic reactors will become the world's major source of electric power, Doctor Seaborg reminded his listeners that no one yet has devised a method for getting rid of gigantic masses of deadly contaminated fission by-products.

Already scientists are troubled with the problem of disposing of relatively small amounts of the radioactive materials from experimental and fuel-producing reactors.

Much of it is buried in the ground; some is dumped at sea; serious proposals have been made that the waste be encased and shot into the outer atmosphere, to become tiny satellites of the earth.

The amount of contaminated waste produced by thousands of reactors is a problem which lends itself ideally to concentrated basic research, Doctor Seaborg suggested.

OTHER SUBJECTS.

These were other subjects discussed at the forum's first sessions:

1—Between one and two million tons of uranium, available at a low or moderate cost, is now known to exist in America and the rest of the free world, according to Jesse C. Johnson, director of the Atomic Energy Commission's division of raw materials.

2—Forty-five years hence all of America's oil, natural gas and coal will have been exhausted, and of necessity the country will have turned to nuclear power to light its homes and run its industries.

3—Radioactive isotopes produced by research reactors are proving amazingly

useful in the oil industry to perform tasks ranging from tracing the birth of carbon deposits inside automobile engines to marking the dividing point between two petroleum products pumped through the same pipeline.

4—Labor will insist upon its rights — willingly waived during the war—to organize within the atomic energy field and to bargain and strike if necessary, according to Charles F. MacGowan, an AFL boilermakers union international representative.

5—A financial expert warned that great care must be exercised in atomic investments, but predicted that in the next twenty years forty billion dollars of investment will be needed for nuclear energy requirements in the United States.

BASIC RESEARCH.

Doctor Seaborg's warning about the Frankenstein aspects of nuclear waste products came during a talk of the value of basic research, as opposed to applied research, with an immediate goal in mind.

He emphasized the importance of "pure" research, and pointed to the fact that most of the world's advances have been based on discoveries made by men with nothing more in mind than satisfying their intellectual curiosity.

Doctor Seaborg deplored the fact that of the \$3,000,000,000 a year spent in the United States on research—by Government, industry, universities and foundations — only 5 per cent is used for the support of basic research.

URANIUM SOURCES.

Johnson, in his talk on the world's uranium potential, pointed out that seven years ago the Belgian Congo was almost the only known source of the atomic fuel.

Now, he added, uranium mining in the United States alone has reached a value of \$100,000,000 a year.

It was Dr. W. C. Rueckel, vice president of Kaiser Engineers, who estimated that the United States will run out of economically recoverable conventional fuels by the year 2000.

"Fortunately," he added, "it appears that the uranium and thorium reserves represent energy reserves at least



ATOM FORUM—E. Finley Carter, left, manager of research operations for the Stanford Research Institute, and Dr. Glenn T. Seaborg, Nobel Prize winning chemist from the University of California, at yesterday's atomic energy forum sponsored by the Stanford Research Institute. Doctor Seaborg spoke on the value of basic research.

twenty times those of our fossil fuels."

IN OIL INDUSTRY.

V. P. Guinn, of the Shell Development Company, at Emeryville, talked of the many uses of radioactive isotopes in the oil industry.

Gordon R. Molesworth, atomic energy consultant to a New York stock and bond house, warned against indiscriminate investment in uranium stocks.

On the other hand, Molesworth added, more than 1,200 industrial firms are already using radioactive isotopes, and these and other firms who will enter the atomic energy field will need up to forty billion dollars in private investments.

S.F. Chronicle 4/8/55
More for Basic Research

THE UNIVERSITY OF CALIFORNIA'S Nobel Prize winner, Dr. Glenn T. Seaborg, said here the other day that Government, industry, the universities and non-profit institutions are putting less than 5 per cent of their expenditures on science into basic research. He argued that basic research funds could very profitably be doubled.

This echoed many previous complaints which leading American scientists have insistently made since the first atomic bomb went off. In just five years, the bomb grew from a pure, scientific concept to an instrument of destiny. That phenomenon could happen again. If this country neglects fundamental scientific investigation, it is possible, of course, that American scientists could fail to open some door that others, say the Russians, might open. Once through it, the Russians might well walk into a new field of knowledge that would lead to their gaining command of an overpowering new force.

Dr. Seaborg says double the basic research budget. Universities would double theirs, if they had the means. Industry, which has been called "the chief consumer of basic research," could well increase its share. Dr. Jesse E. Hobson, director of the Stanford Research Institute, recently suggested that five cents of each tax dollar paid by industry should go into a national basic research fund.

Still another suggestion would be for the Government to earmark for basic research 10 per cent of what it spends — about \$2,000,000,000 a year — for applied research.

There is nothing more important than the discovery of truth. How long are Congressmen, industrial leaders, and all the rest of us going to ignore the warning that we aren't devoting enough attention and money to discovering it?

Lack of Funds 'Slows' Atom, Expert Says

SAN FRANCISCO, April 6. (UP) Dr. Glenn T. Seaborg, noted atomic scientist of the University of California, warns the amount of money allocated for basic atomic research in this country "is much too small."

Seaborg told an atomic industrial energy conference here yesterday that "the total research and development expenditure by Government, industry, universities and non-profit institutions, is presently at a rate of about \$3,000,000,000 a year."

"Even a generously broad definition indicates that no more than 5 per cent of this total annual budget is used for the support of basic research," he said. "It is my opinion that this is much too small."

Not a Waste

Seaborg said there was a tendency to regard basic research as a waste of time and money because it does not produce immediately, practical results.

But he said basic research "is merely applied research with a time delay."

"Willard Gibbs, perhaps the greatest scientist America has produced, was able to see very practical influence of his monumental contributions to thermodynamics during his lifetime," Seaborg said. "But it is doubtful that this ever caused him any concern or deterred him from the most vigorous prosecution of his theoretical studies."

Seaborg said the reluctance of institutions to provide funds for basic research has slowed down progress in the field of nuclear physics in this country.



Gary Ackers (center), 16, Berkeley High School sophomore, receives a trophy as one of the two grand prize winners at the Bay Area Science Fair in San Francisco.

Making the presentation is Dr. Glen T. Seaborg (right), University of California professor of chemistry, and Richard E. Hambrook. Ackers also won a trip to Cleveland.



Robley C. Williams (left), Portola Junior High, El Cerrito, receives the grand prize in his division at the Science Fair from Dr. Glen T. Seaborg, U.C. Nobel Prize winner.

At right, other winners compare notes (from left) Karin Fernandes, Richmond; Hideo Kamimoto, Oakland; Richard Haney, Bob Mimms and Georgette Dulucchi, Richmond.

Tide 4/18/55
Dangerous Neglect

In its preoccupation with immediate, practical results, the U.S. is badly neglecting pure scientific research. The warning was sounded last week by Nobel-Prize-winning Atomic Chemist Glenn T. Seaborg* before a joint meeting in San Francisco of the Atomic Industrial Forum and Stanford's Research Institute. Seaborg's clincher: of the nation's huge (\$3 billion) annual outlay for science, "no more than 5% . . . is used for basic research."

Seaborg outlined the real difference between "basic" and "applied" science. Actually, most "pure" scientists have long been closely involved with practical applications of their studies. e.g., the H-bomb, radar, rocket propulsion. Indeed, when defending their research budgets to outsiders, they "almost universally point to the most outstanding practical applications [they] can single out, and swear that these could [never] have happened without the basic research of past years." Yet, despite all its useful byproducts, pure research stands apart. It is motivated not by the need for an answer to an immediate problem, said Seaborg, but by an "intellectual curiosity [which can] be rated with the highest qualities of mankind," with far-reaching, broad goals and indefinite deadlines. Out of such curiosity come the discoveries which guide all scientific endeavor.

Nevertheless, said Seaborg, industry and government shortsightedly allocate funds piecemeal, harnessing university laboratories to small projects with constant red tape and supervision. "It should be possible to say to more [topnotch] scientists: 'Here is some money to keep you going. Run along and do whatever you want . . . All we ask is that you work hard . . . don't even do that if you can get more accomplished in another way.'"

Just as important, said Seaborg, pure research should be encouraged as the best training for the nation's short supply of young scientists and engineers; in such work develop the Einsteins and Tellers of the future.

How can the present neglect be corrected? Chemist Seaborg's suggestion: double the outlay for pure science. The resulting increase in scientific knowledge, he believes, would make a bigger, basic research program "the greatest bargain the American people ever received."

Washington Evening Star 4/30/53

101st Element of Matter Identified by Scientists

Laboratory Creates Mendeleevium; Called Hottest and Rarest of All

By THOMAS R. HENRY

Science Editor of The Star

Identification of the 101st element—about the hottest and by all odds rarest of the basic forms of matter of which all creation was made—was announced by University of California chemists to the American Physical Society here today.

This element, mendeleevium, was created in the university's radiation laboratory. It does not exist in nature, although probably a small amount was present for a few hours when the earth was created.

The discovery was reported by Drs. Albert Ghiorse, Bernard G. Harvey, G. R. Choppin, S. G. Thompson and Glenn T. Seaborg. The announcement was made at the same time before the Nobel Institute for Physics in Stockholm.

Mendeleevium is the ninth of the trans-uranic elements created in the laboratory in the past decade since the synthesis of neptunium and plutonium out of uranium made possible the atom bomb. None of these exist in nature today, except possibly in undetectably minute quantities. Mendeleevium is one of the strangest of all.

It has a half life, Dr. Ghiorse reported, of somewhere between a half hour and five hours. This means that in such an interval half of any amount originally present will have disintegrated. It appears to be the least stable of the elements, since it splits approximately in two spontaneously.

For the other elements such as uranium 235 or plutonium, the splitting must be accomplished by slow neutron bombardment. The split is accompanied by very intense, penetrating radiation.

The amount created was far too small to be seen. Its existence could be detected only by delicate recording instruments. It was made by bombarding element 99, another synthetic form of matter, with 41 million electron volt alpha particles, or nuclei, on helium atoms.

Similar to Thulium

Its chemical properties are believed to be quite similar to those of thulium, one of the least known of the rare earth metals.

It has at present no practical importance, other than that of throwing new light on fundamental properties of matter.

The California scientists made mendeleevium by bombarding about a billion atoms of element 99. A billion atoms of anything is an amount far too small to be visible. Out of this they obtained only 17 atoms of the new element in eight experiments.

Great haste was necessary because 99 also is an evanescent element with a half life of only 20 days. These 17 atoms long since have vanished so none of the new element exists today.

First indication of the existence of the new element came from indications of two spontaneous splittings of single atoms. These appeared while the scientists were looking for something quite different.

Further work involved passing an intense beam of 33 trillion alpha particles a second through a very small slit on a concentration of element 99.

Shows Unexpected Properties

Possibility of producing the new element had been predicted but when it actually was found its properties were quite different from those expected.

Dr. Seaborg had predicted an elemental particle which would decay slowly by shooting out alpha particles like radium. The material actually found is believed to be an isotope, or irregular form, of the predicted mendeleevium.

Several other atoms rupture spontaneously, but the half-life of all of them is at least 500 times that of the new element.

The element was named for the great Russian chemist, Dmitri Mendeleev, who first constructed the periodic table of the elements by which some of the properties of the substances can be predicted before they are discovered.

Wykoff Speaks at Banquet

The annual banquet of the society at the Sheraton-Park last night was addressed by Dr. Ralph W. Wykoff, Public Health Service physicist, who had just spent two years as scientific attache to the American embassy in London, and Dr. John Von

Neuman, newly-confirmed member of the Atomic Energy Commission.

Dr. Wykoff said that his service abroad had impressed him with the relatively inferior position of research for understanding, as compared with research for supposed practical ends, in the United States. This, he stressed, may be a dangerous development since understanding of nature must be the ultimate goal and research toward this end may not thrive as an appendage to research for profit.

Dr. Von Neuman spoke on the viewpoint of a mathematician toward the physical sciences.

Third New Element Discovered at U.C. Radiation Lab By Top Research Team

By TOM RILEY

A new element has been discovered at the University of California's Radiation Laboratory.

The new base—element 101, named by the atomic researchers "mendelevium" after the 19th century Russian chemist Dmitri Ivanovich Mendelyeev, who developed the atomic periodic system—is the third found at the Radiation Laboratory in recent months.

The discovery was made by Dr. Glenn T. Seaborg, Nobel-prize winning physicist, Dr. Albert Ghiorso, Dr. Bernard Harvey, Dr. G. R. Choppin and Dr. S. G. Thompson, all nuclear research scientists at the campus laboratories.

Ghiorso made the first public announcement of the new discovery when he read a paper detailing the find before members of the American Physical Society meeting yesterday in Washington, D.C.

Thompson, visiting at the Nobel Institute for Physics in Stockholm, Sweden, issued a concurrent description of the new element before scientists there.

Ghiorso explained the new element is a synthetic—or man-made—unit of matter, and has probably not existed on earth

in a natural state for nearly five billion years. It is believed, he added, that the element, one of the so-called trans-uranium elements, did exist during the forming moments of this planet.

Being highly radioactive, with a half-life—period in which half of the mass decays into another lighter element—of from 30 minutes to several hours, element 101 turned into one of the lighter elements shortly after creation, the scientist explained.

The scientists said they produced element 101 by bombarding particles of ekaholmium, element 99, which is another synthetic element, with particles of the nuclei of helium atoms fired through the university's 60-inch cyclotron with a charge of 41 million volts.

It took about two months to complete the identification of the new element which was developed under an Atomic Energy Commission contract.

Mendelevium, whose sole use is to further man's understanding of matter, is the heaviest substance ever known on earth and is located nine steps up the periodic table of elements from uranium, the heaviest substance ever found in nature.

Dr. Otto Struve, U.C. astronomer, explained that very heavy

elements such as 101, might exist elsewhere in a natural state but that due to their high state of radioactivity would still decay into the lighter elements. He explained that in the churning maelstrom of outer space, conditions similar to those artificially created in the U.C. Radiation Laboratory could be creating mendelevium. But, as at the Berkeley atomic center, the element would shortly change into a lighter substance.

The new element, according to Ghiorso, has chemical properties similar to element 69, thulium, one of the group of so-called 14 rare earth elements which occur in nature only in minute quantities and almost always mixed with other ingredients. Thulium has no applied use to date.

The two-month research period during which the scientists hunted for the new element was truly an atomic fantasy, Thompson told the Nobel associates.

The scientist said that he and his colleagues actually made the rare element from about one billion atoms of element 99.

Not only was this collection of material too small to see, but element 99 itself is an unstable, radioactive element with a half life of only 20 days.

Heaviest Atom Known

UC Scientists Discover New Artificial Element

University of California scientists announced yesterday the discovery of another new artificial element, Element 101, the heaviest atom known and possibly the rarest on earth in the last five billion years.

The new element, created in the University's 60-inch cyclotron, does not exist in nature and has never before been observed on earth, the UC research team said.

It is believed to have existed—along with some still heavier elements—at the formation of the earth, but to have decayed, because of its extreme radioactivity, into lighter elements soon afterward.

It was discovered by Albert Ghiorso, Bernard G. Harvey, G. R. Choppin and S. G. Thompson, research chemists, and Glenn T. Seaborg, Nobel Laureate, of the UC Radiation Laboratory.

Ghiorso reported the discovery at the American Physical Society meeting in Washington, D. C., yesterday, while Thompson was reporting it in Sweden.

The identification of the new element was completed two months ago. It was created by bombarding Element 99—another synthetic element—with 41,000,000-electron volt alpha particles, the nuclei of helium atoms, fired from the cyclotron at a tiny target area cooled by water and helium.

Element 101 was named Mendelevium, honoring the 19th century Russian chemist Dmitri Mendeleev whose pioneering in the late 1860's made it possible to predict the properties of elements still undiscovered.

The UC research team reported the new element has no practical place in atomic energy, neither for bombs nor for power production, but should help to broaden man's understanding of matter and atomic energy.

The scientists used a billion atoms of Element 99 in their experiments, producing a total of only 17 identifiable atoms of the new element—all of which promptly decayed by spontaneous fission into lighter elements.

NO PRACTICAL USE.

Despite the fact that it is probably the most radioactive material known to science, mendelevium will have no practical use in atomic energy, either for bombs or power.

The discovery was credited to Albert Ghiorso, Bernard G. Harvey and S. G. Thompson, research chemists, and Glenn T. Seaborg, Nobel Laureate.

This same group, in conjunction with Nobel Laureate Physicist Edwin MacMillan, already has been responsible for the discovery of a number of other transuranium (heavier than uranium, No. 92 in the periodic table), elements such as berkelium, No. 97, named for the city, and californium, No. 98, named for the State.

Mendelevium was created by bombarding element No. 99, another synthetic form of matter, with 41,000,000 electron volt alpha particles—the nuclei of helium atoms—fired by the sixty inch Crocker cyclotron, especially "souped-up" for the experiment.

The intense radioactivity of the new element is indicated by the fact that its half-life is somewhere in the range between a half hour and several hours—that is, half of a given quantity will decay in the form of radioactive emanations in that period.

DOESN'T EXIST.

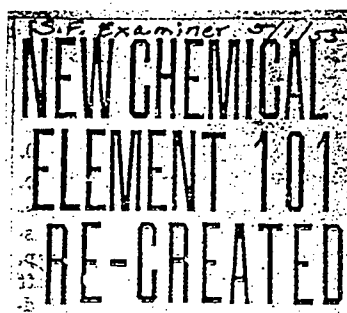
The element does not exist in nature and certainly has never been "seen" by man before.

Those seventeen atoms of mendelevium which appeared to the scientists in the form of tremendous bursts of fissioning energy probably constituted the rarest units of matter known for nearly five billion years.

It is believed by most scientists that mendelevium and other heavier than uranium elements existed at the formation of the earth.

However, such highly radioactive elements as mendelevium probably almost immediately decayed into lighter elements.

Soon after the newly created seventeen atoms were formed they, too, decayed away to lighter elements, and the "new" elements are for the present extinct again.



AEC Says U.C. Scientists Identify Only 17 Atoms

A new chemical element—No. 101—which may have existed briefly when the earth was born, has been re-created by University of California cyclotron scientists.

The Atomic Energy Commission disclosed yesterday that the Berkeley group has identified only seventeen atoms of the intensely radioactive substance, an invisible, unweighable and almost unimaginably tiny amount of matter.

The element has been named mendelevium, after Dmitri Mendeleev, the nineteenth century Russian chemist who was the first man to use the periodic table system as a means of predicting the properties of undiscovered elements.

Element 101 Discovered

Mendelevium, the heaviest and rarest form of matter known, has been produced in the University of California's cyclotron. Identity based on only 17 atoms of new element.

► THE DISCOVERY of element 101, the heaviest and rarest form of matter on earth, has been achieved at the University of California by modern nuclear science.

The new element is a kind of "dinosaur" of the physical world. It existed at the birth of the earth, but like other elements heavier than uranium it sputtered and "died" out early, transforming itself by radioactive decay into lighter elements.

The brief regeneration of the long-extinct form of matter in the Berkeley 60-inch cyclotrons is an exciting chapter in physics.

Only 17 atoms of the new element were identified—an amount of matter that's invisible, unweighable, almost unimaginably small. Probably no form of matter has existed in such small quantity for nearly five billion years—since the birth of the earth.

The discoverers are members of a famous Berkeley science team who have been element-hunting successfully for over a decade. Their triumphs include the discovery of plutonium, fuel of nuclear energy. They are Drs. Albert Ghiorso, Bernard G. Harvey, G. R. Choppin and S. G. Thompson, research chemists, and Dr. Glenn T. Seaborg, leader of the team and a Nobel Laureate. The research was sponsored by the Atomic Energy Commission.

Dr. Ghiorso reported the discovery at the American Physical Society meeting in Washington.

Fissions Spontaneously

Dr. Ghiorso said element 101 has been given the name mendelevium (chemical symbol Mv), in honor of the great 19th century Russian chemist, whose periodic system of the elements is known to every student of high school chemistry. Mendeleev's system has been the key to the discovery of elements for nearly a century.

Mendelevium is intensely radioactive, decaying by spontaneous fission. Its half-life is between a half hour and three hours. It has chemical properties similar to those of thulium, element 69, a rare earth.

The new element has no direct practical value in atomic energy. But like the other transuranium elements, it will help broaden our understanding of matter and of the history of the earth.

Dr. Ghiorso said the big problem in making and identifying the new element was the infinitesimal quantity of matter involved. The experimenters had to "build" element 101 out of a starting material too small to see—about a billion atoms of element 99, another cyclotron-made synthetic form of matter.

To have any hope of detecting the pres-

ence of 101 atoms, the famous 60-inch Crocker cyclotron had to be "souped up." Methods were devised to deliver an extraordinarily intense beam of alpha particles to a very small area (1/32 by 1/4 inch)—some 30 trillion alpha particles, the nuclei of helium atoms, passing through this space each second during bombardments. Drs. G. Bernard Rossi and Joseph G. Hamilton of the Crocker Laboratory performed these bombardments.

Water and helium were used to cool the target, because of the thermal heat generated by the bombardment.

Dr. Ghiorso and his colleagues electroplated their element 99 atoms (mass number 253) on the back of a thin gold foil. When alpha particles passed through the foil and smacked an element 99 atom with an energy of 41 million electron volts, the atom changed into element 101 and was bounced out of the foil. These 101 atoms were caught on an adjacent gold foil.

After bombardment, the gold-collecting foil was dissolved, impurities were removed, and the residue was separated into different chemical components. The fractions consisted of solutions containing element 99, element 100, and one that could only contain element 101 if it had been made.

Then tests of radioactivity were made of the different samples. The scientists expected to find an element 101 isotope with a mass of 255, decaying by alpha particle emission with a half-life of about five minutes.

At first they found nothing significant. Then in one of their experiments they recorded two spontaneous fissions in the 101 fraction. Repetition of the experiment consistently yielded the same result. They found the element has a half-life of from a half-hour to several hours.

Scarcity of the data and the surprising half-life made the scientists skeptical of the data at first. The shortest half-life for a spontaneously fissioning isotope previously reported was 60 days—some 500 or more times longer.

During their experiments, the scientists noted that the element 100 fraction also contained a spontaneously fissioning isotope. This led to an explanation. The scientists suspected they had made an isotope of element 101 different from the one they had sought—an isotope with a mass of 256.

If the strange 101 isotope actually decayed first by electron capture to element 100, and then element 100 decayed by spontaneous fission, the phenomena could be explained.

Off to the Materials Testing Reactor, at

Arco, Idaho, the scientists went. They made a batch of atoms of element 100 with a mass number of 256—which decayed by spontaneous fission with the right half life.

This made everything fit. The identification of element 101 had been confirmed by its chemical properties (separation), and by characteristic radioactivity of its daughter product (element 100, mass number 256).

The scientists say there is still an isotope to be found, of mass 255, decaying by alpha activity.

Science News Letter, May 14, 1955

S.F. Chronicle 6/24/55

AEC to Pay UC Scientists For Patents

The Atomic Energy Commission announced in Washington yesterday that it will pay \$400,000 to four scientists, including two from the University of California, for their patents in the field of atomic energy.

The two UC professors are Glenn T. Seaborg, Nobel prize winner and professor of chemistry, and Emilio G. Segre, professor of physics.

All four were researchers for the University of California during 1940 and 1941 when they discovered "the element plutonium and certain of its isotopes," the commission said.

Neither local scientist was available for comment yesterday, but Seaborg's wife reported that all four plan to use part of the money to set up research funds for their universities.

The four were working under a research grant from UC at the time of their discoveries, she said, and later went to work for the Government.

The other two scientists are Joseph W. Kennedy, head of the chemistry department, and Arthur C. Wahl, professor of chemistry, both of Washington University.

Morning Tribune, Minneapolis 5/31/54

Scientist Can't Tell If Atom Is Force for Good

By CARL T. ROWAN
Minneapolis Tribune Staff Writer

ST. PETER, MINN. — Although there appear to be many potential peacetime uses of atomic energy, it will be several years before we know whether the atomic age will serve mankind and the forces of good more than it serves the forces of evil.

This was the commencement message delivered at Gustavus Adolphus college Sunday by Dr. Glenn T. Seaborg, University of California atomic scientist who won the Nobel prize for chemistry in 1951 for his discoveries in connection with plutonium.

SEABORG SAID the nuclear chain reaction from which man has produced awesome explosions also can produce vast amounts of energy under controlled conditions through nuclear energy machines.

But scientists are not yet able to determine the full extent of the peacetime uses of this energy, he said.

Seaborg said two important aspects of peacetime use of the atom are its application to industrial power uses and use of radioactive by-products for research in medicine, biology and other scientific fields.

He said "fissionable substances" such as plutonium and uranium will be used as fuel in specially designed atomic energy machines for industry. But a number of difficult engineering problems still must be solved.

THE SCIENTIST said one

pound of fissionable substance is equivalent in heat energy to about 10 million kilowatt-hours of energy, or to the heat obtained by burning 2,000 tons of coal.

"But it will be a good many years before energy of this type will compete with common sources of energy such as coal," he said.

Seaborg added that atomic energy industry probably will be developed, but that "it will never be possible to use these atomic energy devices to propel ordinary automobiles" because necessary materials to shield against radioactive rays would be so heavy.

It may be possible to use atomic energy to propel boats and large airplanes, he said.

Referring to the use of radioactive materials in medical and biological research, Seaborg said:

"IT SEEMS CERTAIN the average man will benefit from these aspects of atomic energy before he will benefit from its use for the production of power.

"In fact, I feel that not only will the average man profit first from this aspect but also that the greatest service to humanity in the long run will come from the use of these radioactive materials."

The use of radioactive materials also may lead scientists to a better understanding of how the sulfa drugs and the antibiotics work.

AEC to Pay 4 U.C. Men \$400,000

Four of the University of California's atomic energy pioneers have been awarded \$400,000 for their contributions to research before World War II.

The Atomic Energy Commission announced in Washington, D.C., yesterday that the men, whose work later at Los Alamos contributed to the development of the first atomic bomb, would be paid the fortune for patents they hold.

Two of the men, Dr. Glenn T. Seaborg, Nobel Prize winner of 1154 Glenn Road, Lafayette, and Dr. Emilio G. Segre of 1617 Spruce St., Berkeley, are still on the U.C. faculty at Berkeley. Seaborg is professor of chemistry; Segre, professor of physics.

LEFT U.C. AFTER WAR

The others, Dr. Joseph W. Kennedy and Dr. Arthur C. Wahl, left the University of California after their war-time services at Los Alamos, which was and still is operated by the university, and are now on the faculty of Washington University at St. Louis, Mo.

Dr. Seaborg, who received his A.B. from the University of California at Los Angeles in 1934 and his Ph.D. at Berkeley three years later, has been a faculty member ever since. He is recognized as one of the nation's leading atomic scientists and has been awarded scores of honors since the revelation of his role in secret World War II research projects.

The Atomic Energy Commission announcement said that the four shared discovery of the element plutonium and certain of its isotopes during their work at the University of California Radiation Laboratory in 1940 and 1941.

LED TO APPLICATION

Their discoveries led to the application of the new element to atomic energy purposes.

The men were not employed by the Government at the time, the A.E.C. said.

Mrs. Seaborg said that the four planned to use the funds to finance research at U.C. and at Washington University. The



PROF. GLENN T. SEABORG
He shares \$400,000

fund, she said, is subject to income tax. The work was all done, she said, "before the government entered the atomic picture."

S.F. Examiner
**2 U.C. Scientists
Share \$400,000
Patent Fund**

6/26/55

Two famed University of California atomic scientists, Nobel Prize winner Dr. Glenn T. Seaborg, professor of chemistry, and Dr. Emilio G. Segre, professor of physics, will share part of \$400,000 with two former colleagues for rights to prewar inventions and research on atomic matters.

The former colleagues are Dr. Joseph W. Kennedy, head of the chemistry department at Washington University, St. Louis, and Dr. Arthur C. Wahl, an associate professor of chemistry at the same university.

Research Fund

The announcement was made yesterday in Washington, D. C., by the Atomic Energy Commission, which said the "certain inventions in plutonium separative processes" were developed during 1940 and 1941, when all four scientists were associated with the University of California.

A University of California

spokesman said the bulk of the \$400,000 will go into a university research fund, under an arrangement by which the university retains patents on inventions developed by scientists during experiments which are part of their regular duties.

Under this same arrangement, the scientists are given a share of the patent money, the figure varying in different cases. The spokesman said there was no indication how much Seaborg, Segre and the other two will receive.

The \$400,000 was awarded for a commercial process by which plutonium is separated from uranium.

FOUND ELEMENT.

Dr. Seaborg and his colleagues in 1940 and 1941, after demonstrating the existence of element 94 (PU 238), succeeded in preparing and identifying plutonium 239 and determining that, like U235, this isotope fissions with slow neutrons.

The discovery was significant because it provided an alternate and easier method of obtaining fissionable material from nature.

N.Y. Times 6/26/55
A.E.C. AWARDS \$400,000

4 Scientists Get Money for Plutonium Processes

WASHINGTON, June 25 (UPI)—The Atomic Energy Commission today awarded \$400,000 to four nuclear scientists in return for all rights to plutonium separation processes they had developed.

Receiving the award were Drs. Glenn T. Seaborg and Emilio G. Segre, University of California, and Joseph W. Kennedy and Arthur C. Wahl, Washington University, St. Louis, Mo.

Lewis L. Strauss, chairman of

the A. E. C. said the experts had developed the processes before engaging in Government atomic contracts. Patent applications had been filed secretly between 1945 and 1947.

Mr. Strauss said the men had developed the processes in late 1940 and early 1941 while they were working at the University of California in Berkeley.

Their discoveries, he said, related particularly to the chemical properties and fissionability of plutonium-239, one of the materials out of which atomic bombs can be made.

Signal July 15
Huntington Park 1955
Plutonium Award

Seaborg to Share in Rich Prize

Dr. Glenn T. Seaborg, who won \$35,000 with the Nobel Prize two years ago, now can claim an additional \$100,000 for discovering plutonium, the atomic explosive used to blast Nagasaki.

(Dr. Seaborg grew up in the Southeast District and got his early schooling here. He is the son of Mr. and Mrs. H. Theodore Seaborg, who live at 9237 San Antonio, South Gate.)

The current issue of Science, official publication of the American Association for the Advancement of Science, reports the Atomic Energy Commission has approved payment of the sum to each of four scientists.

Two of the scientists, Seaborg and Dr. Emilio G. Segre, are on the faculty at University of California at Berkeley. The other two are Drs. Joseph W. Kennedy and Arthur C. Wahl of Washington University in St. Louis, Mo.

The money is to be paid for the acquisition of all rights to the invention of plutonium separation processes before the scientists engaged in Government contracts.

July 17, 1955
South Gate Press

Plutonium Find Nets \$100,000

Dr. Glenn T. Seaborg, 43, a former South Gate resident whose parents still live here, has been awarded \$100,000 as one of four scientists who discovered plutonium, the explosive used in atomic weapons.

The University of California research scientist was one of four men for whom similar awards were authorized by the federal atomic energy commission.

NOBEL PRIZE-WINNER

In 1951 Dr. Seaborg was one of two persons awarded the Nobel prize.

He is the son of Mr. and Mrs. Theodore Seaborg, 9237 San Antonio avenue. The elder Seaborg is a retired machinist.

Word that the atomic energy



DR. GLENN SEABORG
pride of Victoria . . .

commission had approved the payment of \$100,000 each to four atomic scientists came in the July 15 issue of Science, official organ of the American Association for the Advancement of Science.

RIGHTS PURCHASED

The cash awards are paid for acquisition of all rights to the invention of plutonium separation processes developed before the scientists engaged in government contracts.

The other three scientists who were awarded similar sums are Dr. Emilio G. Segre, also of the University of California at Berkeley; Dr. Joseph W. Kennedy and Dr. Arthur C. Wahl, both of the faculty of Washington university, St. Louis, Mo.

Dr. Seaborg was born in Michigan and came here in 1922 at the age of 10. He attended Victoria elementary school and Watts high school. He was graduated from Watts high in 1929, just before South Gate high school opened its doors for the first time.

He was graduated from UCLA in 1934 and three years later won his doctorate at the University of California in Berkeley. He majored in chemistry.

BOMB PROJECT

During World War II he worked on the federal atomic bomb project at the University of Chicago.

He and his wife and five children live in Lafayette near Berkeley.

Plutonium *L.A. Times* Discoverer 7/15/55 Wins \$100,000

Dr. Glenn T. Seaborg, a 1934 UCLA graduate who won \$35,000 with the Nobel Prize two years ago, now can claim an additional sum of \$100,000 for discovering plutonium, the atomic explosive used to blast Nagasaki.

The July 15 issue of Science, official organ of the American Association for the Advancement of Science, discloses that the U.S. Atomic Energy Commission has approved the payment of \$100,000 each to four atomic scientists.

Payment for Rights

The money is to be paid for the acquisition of all rights to the invention of plutonium separation processes before the scientists engaged in government contracts.

Two of the \$100,000 winners, Dr. Seaborg and Dr. Emilio G. Segre, are on the faculty at the University of California, Berkeley. The other two are Drs. Joseph W. Kennedy and Arthur C. Wahl, both on the faculty of Washington University, St. Louis.

L.A. Examiner Atom Awards to 2 UC Men

Professors Each Win
\$100,000

Two University of California professors, Dr. Glenn T. Seaborg and Dr. Emilio G. Segre, have been awarded \$100,000 each for their atomic discoveries by the U. S. Atomic Energy Commission, it was announced yesterday.

Seaborg, a 1934 graduate of UCLA and winner of a \$35,000 Nobel Prize two years ago, was paid that sum for his discovery of plutonium. He and Segre are both on the faculty of the Berkeley campus.

The magazine Science, official organ of the American Association for the Advancement of Science, said that awards of \$100,000 each were also made to Dr. Joseph W. Kennedy and Dr. Arthur C. Wahl, both of Washington University, St. Louis, for their atomic discoveries.

00516

July 15, 1955

N.Y. Herald-Tribune

Russians Near U.S. In Atomics

European Edition
By Earl Ubell 8/15/55

Special to the Herald Tribune
Copyright New York Herald Tribune, S.A.
GENEVA, Aug. 7.—The Soviet

Union is not ahead of the United States and other Western nations in applying atoms for the benefit of mankind, but it is not far behind either.

This became clear as six countries' technical atomic exhibits opened at the Palace of Nations today to mark the beginning of the huge "atoms-for-peace" conference sponsored by the United Nations.

Although it is obvious that both East and West still keep back data on atomic technology, scientists could tell from the exhibits that the technologies in both places are of roughly comparable stature.

However, there is one difference: the Soviet Union's show lacks the great technical detail and sophistication of the United States display. There are also many more models of atomic piles and other equipment in the United States' exhibit than in the Russian.

U.S. Atomic Pile

Then, too, the United States government has on the palace grounds a working atomic pile, the one that President Eisenhower operated when he attended the Big-Four conference here recently. The Russians do not have such a pile here.

There are also details of atomic processes in the United States exhibit never before revealed:

There is a panel full of uranium bars—called fuel elements—held secret until now. These fuel elements go into the heart of an atomic pile to cause a chain reaction and heat for electric power. Their design is crucial to the success of the reaction.

Four Russian scientists stopped at this pile. They stared and stared. They had no comment about the pile, but one of them said that he liked the exhibit as a whole.

Reactor Models

Also demonstrated in the American show were models of eight nuclear reactors—another word for atomic piles—either now in operation or under construction. The United States has 22 known atomic piles. There are many secret ones used for the production of bomb material.

Delegates from the 72 nations attending the conference can also see a model of a formerly top-secret processing plant in Idaho for removing radio-active waste materials from burned-out uranium fuel. Such a plant is the backbone of present power concepts.

In addition, there were detailed displays of methods of processing uranium and thorium, the two atomic fuels, from the ore to the metal. Other reactor metals, such as beryllium and circonium, two rare elements, were also shown in their processing.

Three Soviet Models

In the Russian show there were models of three reactors: the Soviet Union's vaunted 5,000-kilowatt atomic-power electric station and two research reactors. It could not be learned where these reactors were located. In another part of the exhibit the Russians announced that they have adopted the American names proposed by Dr. Glenn Seaborg, a United States atomic-energy pioneer, for those elements which have been discovered and manufactured in atomic piles. They include such names as americium and berkelyium.

There are also numerous gadgets employing radio isotopes—the elements that emit rays after having been exposed in an atomic pile. The isotopes were applied to steel production, measuring for sickness, counting bottles of beer, treating cancer and doing fundamental biological and medical work.

The impression was that although these methods were of high quality, they were new in the United States and Britain two to three years ago. The United States biological and agricultural experiments displayed today were far more sophisticated.

Cancer 'Cures'

In the treatment of cancer the Russians reported using cobalt-60, the isotope that emits high-energy X-ray. They have pictures of infants and old people "cured" of face cancer, and quote statistics that up to 68 per cent were "cured" of one type, called angioma. They did not indicate how many of these patients have survived five years or more, the usual American standard of curability.

Britain had a large panel display revealing the extent of its atomic development program, with details and two new projects, both breeder reactors called Zephyr and Zeus, locations of both were given.

France reported on its existing reactor and the one it has planned. Canada displayed details on its two reactors and there were other exhibits from Belgium and the Scandinavian countries showing the state of advancement there.

Tomorrow, the technical presentations will be started and will continue until Aug. 20.

SOUTH GATE PRESS

PUBLISHED EVERY SUNDAY AND THURSDAY AT 8115 SEVILLE AVENUE, SOUTH GATE, CALIFORNIA

Thursday, August 11, 1955

Page Seventeen

To Advise U. S. Delegation

Dr. Glenn Seaborg at Geneva Atoms-for-Peace Conference

Dr. Glenn T. Seaborg, professor of chemistry at the University of California and co-discoverer of plutonium, is one of eight UC scientists in Geneva as technical advisors to the American delegation to the International Conference on the Peaceful Uses of Atomic Energy.

Dr. Seaborg is the son of Mr. and Mrs. Theodore Seaborg, 9237 San Antonio avenue. He attended Victoria elementary school and Watts high school when he lived in South Gate.

He is a Nobel Prize-winner and recently was awarded \$100,000 by the federal atomic energy commission for his share of the rights to the invention of the plutonium separation process.

TO LEAD SESSION

At Geneva, Dr. Seaborg will preside at a scientific session on the chemistry of the transuranium elements.

Accompanying Dr. Seaborg from the U C science staff are Dr. Ernest O. Lawrence, director of the radiation laboratory and inventor of the cyclotron; Dr. Melvin Calvin and Dr. B. B. Chunningham, professors of chemistry; Albert Ghiorso and Karl K. Hyde, chemists in the radiation laboratory; Dr. John H. Lawrence, director of the Donner laboratory, and Dr. Robert S. Stone, professor of radiology at the university's medical center in San Francisco.

Created by H-Blast

N.Y. Herald-Tribune
Paris 8/12/55

Two New Elements Named Einsteinium and Fermium

By the United Press

GENEVA, Aug. 11.—The names of two scientists who died in the last year, Albert Einstein and Enrico Fermi, were immortalized by the christening of chemical elements 99 Einsteinium and 100 Fermium, it was announced here yesterday by Dr. Albert Ghiorso, of the University of California at Berkeley.

Science Service writers Watson and Helen M. Davis said that Dr. Ghiorso also declared that both elements were first discovered in debris from the October, 1952 hydrogen-bomb explosion by Dr. Glen Seaborg, also of the University of California.

A group of scientists led by Dr. Seaborg later made Einsteinium and Fermium in a cyclotron and in nuclear reactors at Berkeley, Argonne National Laboratory and Los Alamos.

The symbol for Element 99, Einsteinium, is plain E. That for 100 is Fm. Now all discovered elements are named, since 101 was previously named Mendeleevium, after the Russian D. Mendeleev, who announced the periodic system of the elements in 1869.

This name pleased the Russians, who placed it on the giant periodic table of the Soviet exhibit at the International Conference on the Peaceful Uses of Atomic Energy here.

The Russians are expected to replace their labels for 99, "athanium," and for 100, "centurium," with the announced United States names.

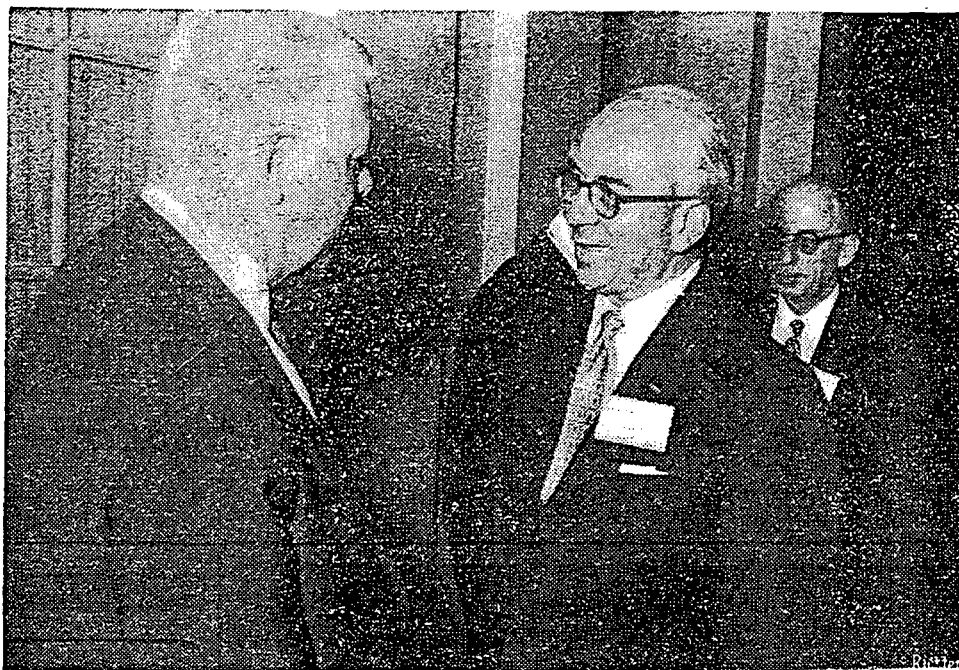
Naming the new elements was delayed by secrecy imposed by their creation in the thermo-nuclear reaction when Uranium 238 added 17 neutrons in one jump, becoming Einsteinium 255, which changed to Fermium 255 by electron loss.

The elements were found in hydrogen-bomb dust about 200 miles from Eniwetok.

Subsequently both 99 and 100 have been made in the cyclotron by bombardment with Nitrogen 14, and in a reactor by successive neutron irradiation of plutonium.

A LA CONFÉRENCE ATOMIQUE

Les exposés d'hier ont manifesté un accord total entre les conceptions soviétiques et occidentales dans le domaine des réacteurs



Le chef de la délégation soviétique, professeur Skoceltzine (légèrement de dos), et l'amiral Strauss, chef de la délégation des Etats-Unis (Interpresse)

crée à la chimie des éléments lourds, fut dirigée par le professeur G.I. Seaborg, l'URSS, les Pays-Bas, les Etats-Unis et l'Angleterre y ont participé activement en présentant des communications.

Enfin, les réunions consacrées aux questions biologiques et médicales ont occupé toute la journée, et plus spécialement les problèmes de l'utilisation des isotopes dans les diagnostics et les études cliniques. Le Royaume-Uni, l'URSS, les Etats-Unis, le Canada, la France, la Roumanie, l'Ukraine, l'Inde et le Brésil ont présenté des communications.

La journée d'hier à la Conférence atomique a été, semble-t-il, plus chargée encore que celle de jeudi, puisque ce ne sont pas moins de quarante-cinq exposés qui ont été présentés au cours des six réunions. Vendredi encore, vingt films scientifiques et documentaires (cinq en anglais, cinq en français, cinq en russe et cinq en espagnol) ont été projetés dans la salle de cinéma du conseil. Si l'on songe que des conférences ont lieu encore certains soirs — une sommité française, le professeur Louis Leprince-Linguet parlera lundi soir — conférences auxquelles le public peut assister, il n'est pas exagéré de dire que les congressistes n'ont pas une heure de loisir, à tel point que des exposés seront encore donnés cet après-midi.

Le réacteur suisse de recherche

Le réacteur suisse de recherche a été présenté, hier matin, par le professeur W. Zünti, de l'Ecole polytechnique fédérale. Ce réacteur est le fruit de la collaboration de MM. Haeig, de la maison Brown-Boveri, à Baden, F. Alder, de l'Institut de physique de l'Université de Bâle, et du professeur Zünti, de l'Institut de physique de Zurich. Ce réacteur est encore en projets, mais ses plans sont fort avancés, et les travaux de réalisation commencent.

ront cette année encore. Le réacteur sera installé sur la rive droite de l'Aar, sur le territoire de la commune argovienne de Wurenlingen, à environ 30 kilomètres de Zurich. Le bâtiment principal mesurera 38 mètres sur 33 et abritera le réacteur et la plus grande partie de l'appareillage. En revanche, les sections de physique, isotopes, chimie et métallurgie ainsi que les ateliers et les bureaux d'administration seront logés dans des bâtiments séparés et plus petits; par la suite, un laboratoire chaud ou « hot-lab » viendra s'ajouter à ce complexe. Le réacteur suisse a été conçu comme un réacteur de recherches à basse température — il utilisera l'uranium naturel comme combustible et l'eau lourde comme élément modérateur et réfrigérant.

Le rapporteur suisse a donné, ensuite, force détails d'ordre techniques à l'aide de schémas projetés sur l'écran.

Le réacteur envisagé est du type à uranium naturel, modéré à l'eau lourde et refroidi par ce même agent. Les éléments combustibles constitués par des cartouches d'uranium gainées d'aluminium sont disposés suivant un réseau à cellules carrées comportant 208 positions à l'intérieur d'un bac cylindrique en aluminium. L'eau lourde servant à la modulation et celle qui est utilisée pour le refroidissement empruntent un système de circulation commun, qui assure le maintien d'une température assez basse dans le modérateur, et un refroidissement adéquat avec une vitesse d'écoulement de 3 m./sec. dans un canal annulaire étroit, prévu le long des cartouches. Le refroidissement est presque indépendant des variations de niveau de l'eau lourde. L'échangeur de chaleur, prévu entre l'eau lourde et l'eau ordinaire, est étudié pour plus de 10 Mw.

Quinze canaux verticaux donnent accès au flux intense de neutrons du noyau, permettant l'installation de boucles à haute température, avec ou sans cartouches. Un grand nombre de canaux horizontaux qui se terminent dans le réflecteur de graphite se prêteront aux expériences nucléaires et à la production d'isotopes.

Cet exposé a été suivi, avec une attention soutenue, par les nombreux savants atomiques.

Un délégué britannique a demandé ensuite des précisions sur le système de réfrigération par eau lourde, le chiffre de 0,6 tonne lui paraissant trop peu élevé.

Le rapporteur suisse a répondu qu'il croit possible d'arriver non pas à 0,6 mais à 0,8 tonne, grâce à l'utilisation pour l'échangeur, d'un type très spécial d'aluminium.

Ajoutons que le réacteur américain acheté par la Suisse et exposé actuellement à Genève, sera installé à Wurenlingen où il fonctionnera en attendant la mise en service du réacteur de conception suisse.

LES AUTRES RÉUNIONS

Apparition de l'einsteinium

Fort intéressante a été la séance consacrée à la chimie des éléments lourds, à savoir à la chimie des éléments transuraniens connus. Ce fut une séance consacrée à la théorie de ces éléments et à leurs particularités. Pour la première fois, les savants ont fait usage des noms donnés à

deux éléments nouvellement découverts et qui portaient jusqu'ici les nombres atomiques 99 et 100. L'élément 99 portera le nom d'*einsteinium*, en souvenir du grand savant et le symbole *e*. Et l'élément 100 a été baptisé du nom de *fermium*, en souvenir du savant atomiste italien Enrico Fermi, qui est mort récemment à Chicago et enseigna longtemps aux Etats-Unis. Le symbole du fermium est *fm*. ces éléments ont été découverts dans les débris recueillis après l'explosion thermonucléaire d'Eniwetok, en 1952 puis isolés et analysés par les laboratoires de l'université de Californie, d'Argonne et de Los Alamos (Californie).

Un autre élément découvert récemment est le mendelevium. Il a été trouvé par des savants atomistes de l'université de Californie qui lui ont donné le nom d'un chimiste russe du siècle passé, Mendeleev, en témoignage de reconnaissance pour ses travaux scientifiques.

Rappelons à ce propos qu'il existe 92 éléments naturels. Le 92^{me} étant l'uranium. Tous les éléments à partir du chiffre 93

sont des éléments synthétiques créés par l'homme. Tandis que les éléments naturels sont stables, les éléments synthétiques n'ont qu'une demi-longévité, voire une longévité très courte de quelques heures même et c'est la raison pour laquelle les savants ne cessent d'œuvrer pour recréer ces éléments synthétiques.

La séance consacrée à la chimie des éléments lourds était présidée par le professeur Glenn-Theodor Seaborg, de l'université de Californie, qui découvrit, en compagnie d'autres savants des mêmes laboratoires, les deux nouveaux éléments fermium et einsteinium.

L'état des recherches en Belgique

La Belgique, pays peuplé et fortement industrialisé, entend jouer un rôle dans le développement et l'exploitation de l'énergie nucléaire. On sait qu'elle possède au Congo belge des gisements en uranium qui sont parmi les plus vastes du monde. En 1947, déjà, l'Institut interuniversitaire de physique nucléaire — qui devint par la suite l'Institut interuniversitaire des sciences nucléaires — était constitué sous l'égide du fond national belge de la recherche scientifique, afin de coordonner les recherches nucléaires dans les divers établissements d'instruction supérieure. En 1950, le gouvernement créait le commissariat à l'énergie atomique. L'année suivante, le Centre d'études pour les applications nucléaires voyait le jour.

Parallèlement aux organismes officiels des initiatives privées voyaient le jour. Ce sont, le syndicat d'étude de l'énergie nucléaire, au capital de 40 millions de francs, qui groupe la majorité des sociétés industrielles belges susceptibles de jouer un rôle actif dans l'étude de la construction de centrales atomiques, et, d'autre part, le syndicat d'étude des centrales atomiques, qui réunit les producteurs d'électricité et dont l'objet est l'exploitation de centrales atomiques, la production et la distribution du courant. Il existe, enfin, une association belge pour le développement pacifique de l'énergie atomique qui groupe les représentants des milieux les plus divers et dont le but est de susciter en Belgique un mouvement d'intérêt national et de promouvoir la collaboration internationale en matière d'énergie nucléaire.



Le Dr To Dosumu Johnson, directeur de l'Université du Libéria, et M. John L. Cooper
(Intéresse)

Vers la construction d'un réacteur expérimental

La Belgique prévoit la construction, à Mol, dans la Campine, d'un réacteur expérimental à uranium naturel, de moyenne puissance, et d'un ensemble de laboratoires spéciaux. On pense que le réacteur pourra être mis en marche en 1956.

Pour sa part, l'industrie belge, qui construira les dispositifs de réglage du premier réacteur expérimental de Mol, a mis au point un procédé industriel d'élaboration de l'uranium métal naturel. Elle est en mesure, main-

tenant, de passer à la production industrielle de ce métal. Le syndicat d'étude de l'énergie nucléaire — qui groupe les industriels — étudie des projets visant à la construction d'un réacteur d'une puissance de l'ordre de 100.000 kW. et qui pourrait être aménagé dans un avenir rapproché.

Rappelons également que la Belgique est membre du Centre européen de recherches nucléaires et qu'elle participe à la Société européenne de l'énergie atomique créée l'an dernier à Londres, et dont le but est de favoriser les recherches sur le plan international spécialement en vue des applications industrielles.

Minneapolis Star
**Generation
Lag Cited
in Scientists**

Other Chemistry Meeting Stories
on Page 3.

By GEORGE RICE
Minneapolis Star Staff Writer

One of America's top basic research scientists believes it would take a generation "if we started today" to build up the scientific manpower this nation needs.

Dr. Glenn T. Seaborg, co-discoverer of the atomic fuel, plutonium, and co-winner in 1951 of the Nobel prize for his nuclear research, is attending the 128th meeting of the American Chemical society at the University of Minnesota.

Seaborg, professor of chemistry at the University of California, said the nation is short of scientists and engineers generally, but he emphasized particularly what he considers a most serious lack of men engaged in basic research.

"To get more out of the money spent on practical and applied research, more must be spent on basic research," he said. "About 5 per cent of the money spent on research now goes for basic work. That percentage should be at least doubled.

"The public, too, needs to be better informed about the needs in both the pure and applied fields. The trouble, of course, goes right back to our high schools. This is not news—we have known it for a long time—but we need to begin doing something about it."

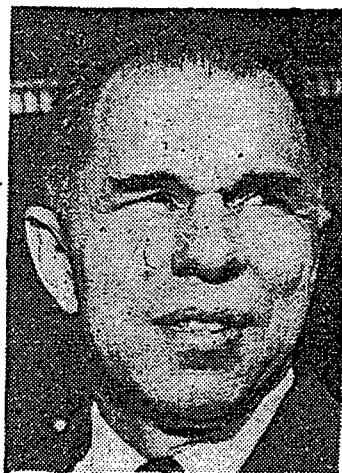
It is in the high schools, Seaborg explained, that the interest which makes men scientists is born. By the time young men and women reach college, their minds generally have been made up as to their careers.

But, he added, high school science classes no longer are being taught by teachers with science training who can awaken an enthusiasm for science as a life's work.

The better pay in industry has drained away many of the teachers and those who would have been teachers, at the same time that the growing school population demands a great number of them, he said.

There are too many science classes being taught, he said, by men and women with no previous science training who are simply given a text book and told: "Here, you teach chemistry — or biology, or physics."

The discovery of plutonium is a case in point of Seaborg's



DR. GLENN T. SEABORG
Scientists start in high school

argument for more basic research.

The great Italian scientist, Enrico Fermi, and his associates, among them Seaborg, created plutonium, the explosive element in the atomic bomb, through work at Stagg field in Chicago in 1942.

In their atomic "pile," the heaviest natural element, uranium-238, was converted into the explosive plutonium. Plutonium was a brand-new element, artificially created by man. Its atomic number is 94. Uranium is the heaviest natural element; its number is 92. All elements above 92 are synthetic.

Since then, Seaborg and other basic scientists have been working on still more new elements. He is co-discoverer of four of these, called transuranium elements.

Recently the transuranium elements 99 and 100 were revealed. No. 99 has been named

einsteinium, for Albert Einstein, and 100 has been named fermium, for Fermi. Both were identified in collected debris of a thermonuclear explosion in 1952, but publicly announced only a few days ago.

Now Seaborg and his colleagues have announced element 101, discovered at Berkeley last spring and named Mendelevium, for the nineteenth-century Russian scientist Dimitri Mendeleev.

Seaborg, 43, is a native of Ishpeming, Mich. He received his education at the University of California at Los Angeles and at California (Berkeley). He received the American Chemical society's \$1,000 award in pure chemistry in 1947, and in 1948 the William H. Nichols medal of the ACS's New York section. He shared the Nobel prize with Dr. Edwin McMillan of the University of California.

More Scientists Held Vital

Dr. Seaborg Would Foster Basic Research; Addresses Groups Here

By JAMES K. DeLANEY
Post-Gazette Staff Writer

This nation's shortage of scientific manpower is so deep that it would take a generation to build it up to requirements if the effort were started today.

Often heard here recently, the call to close the breach in the ranks of American scientists was sounded

again on a higher note last night by one of the architects of the atomic age, Dr. Glenn T. Seaborg.

The co-discoverer of the atomic fuel, plutonium, and 1951 winner of the Nobel prize for his nuclear research said that, numerically speaking, the farthest behind in the general lag of scientists and engineers are the men devoted to basic research.

Urges More Basic Research

Dr. Seaborg, professor of chemistry at the University of California, urged remedying the situation in an interview before he addressed the Pittsburgh Section of the American Chemical Society at Mellon Institute.

It is something of a cart-before-the-horse situation, according to the lanky, 47-year-old scientist who finds time to be faculty adviser on athletics at California "as a change of pace" from his laboratory labors.

Money spent on practical and applied research would get better results, he said, if more were spent on basic research.

"About 5 per cent of the money spent on research now goes for basic work. That percentage should be at least doubled," he said.

The too-thin ranks of science, Dr. Seaborg said, constitute a problem to be attacked by making the public aware of it, and by starting the remedy where the trouble begins—"in our high schools."

Weakness in High Schools

For it is in the high schools, he emphasized, that boys are inspired to become men of science. But he explained the high schools lack teachers who themselves have science training enough to want to pass it on to others as a career.

The weakness of high school faculties, he said, is the result of industry's higher pay having enticed many of the science teachers away from the classroom—ironically at a time when increased student enrollment needs more of them.

In his session with the district's chemists last night, Dr. Seaborg described research in his special field of the artificial trans-uranium elements. These are the elements 93 to 101, inclusive, which are heavier than uranium (element 92).

Dr. Seaborg, whose work in plutonium made possible easier and cheaper production of atomic bombs, participated in the isolation of elements 94 (plutonium) to 101.

Elements 99 and 100, resulting from experiments at the University of California's laboratories at Berkeley and Los Alamos and the Argonne Laboratory in Chicago, have been named Einsteinium and Fermium for the late Dr. Albert Einstein and Dr. Enrico Fermi. They were found in the debris of thermo-nuclear explosions.

Element 101—only 17 atoms of which have been classified in long research—was announced last spring after its



DR. GLENN T. SEABORG
Nuclear researcher here.

discovery by cyclotron bombardment at the Berkeley laboratory.

Dr. Seaborg originally planned his Pittsburgh visit not to talk science but to see the Pitt-California football game at the Stadium tomorrow. But the game has become a side interest because of the requests for his presence at scientific gatherings over the week-end.

Tomorrow morning Dr. Seaborg will address a chemistry seminar at Carnegie Institute of Technology. Sunday, he will attend a meeting of the board of the new Nuclear Science and Engineering Corporation.

Handwritten: *Huntington Park Signal*
U.S. Scientific Manpower Pool
9/24/55
Low—Dr. Seaborg

BERKELEY, Sept. 24. (U.P.)—Dr. Glenn T. Seaborg, Nobel laureate of the University of California, warned a group of California newspaper representatives yesterday that America is running dangerously low on scientific manpower.

Seaborg, who won honors in chemistry and is a co-discoverer of the atomic fuel, plutonium, said the shortage of scientists and engineers is serious and deep-rooted.

"If we started today to build up the scientific manpower this country needs, it would take a generation," he said in an address to the California Newspaper Publisher's Association.

Small Papers To Hold U.C. Workshop

**Representatives of 50
California Publications
To Join 2-Day Parley**

BERKELEY, Sept. 21 — Representatives of 50 Northern California weekly and small daily newspapers will attend the annual California Newspaper Publishers Association weekly newspaper workshop at the University of California Friday and Saturday.

The sessions are being sponsored by CNPA's Gold Unit, newspaper publishers in El Dorado, Nevada, Placer and Sacramento counties.

Registration for the workshop meetings will open at 11 a.m. Friday at Eshleman Hall. William F. Calkins, manager of U.C. agricultural publications, will be the main speaker at a luncheon meeting Friday at International House.

Dr. Glenn T. Seaborg, U.C. chemist and Nobel Prize winner, will be the main speaker during a dinner meeting at 7:30 p.m., Friday in the Men's Faculty Club. He will speak on "Atoms for Peace."

All general meetings of the program will be held in Room 145 of Dwinelle Hall. At 10:45 a.m., Saturday, the group will elect new officers and designate the conference place for 1956.

Richmond Observes 50th Birthday; Presents 'Atoms for Peace' Show

S.F. Examiner

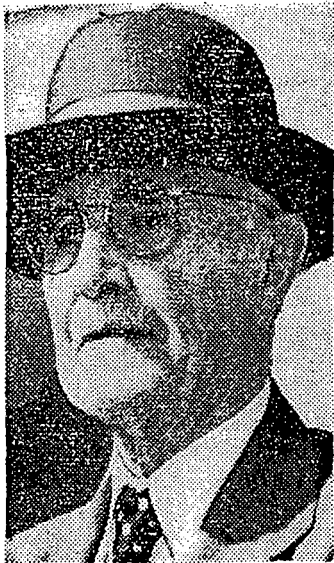
Founder of City Attends Fete

10/3/55

Pioneer residents and an atomic age display were centers of interest yesterday as the city of Richmond opened its fiftieth anniversary celebration.

The past was best represented by 90 year old Augustin S. Macdonald, who founded the Contra Costa County industrial community half a century ago.

Macdonald took part in the opening ceremony, on an outdoor stage in the civic center plaza, with a noted prophet of the future, Dr. Glenn T. Sea-



AUGUSTIN MACDONALD
Founder of Richmond

borg, associate director of the University of California radiation laboratory.

Doctor Seaborg, the principal speaker, was introduced by Dr. Harold Fidler, manager of San Francisco operations for the Atomic Energy Commission.

Doctor Seaborg made a strong plea for increased funds to support basic research.

"The beneficial results from an increased amount of basic research would be so great that this would be the biggest bargain the American people ever received for their money," he said.

He said government, industry, universities and non-profit institutions are spending \$3,000,000,000 yearly for research and development, but basic research receives too small a share.

"The problem of a properly balanced research effort is paramount today, not only because of the importance of our defense research, upon which our very existence depends, but also because our whole national economy rapidly is becoming tied closely to continued technological advance," the noted scientist said.

SUBSTITUTES SOUGHT.

He predicted world supplies of conventional fuels will be running low in several decades and said that substitutes must be found. A pound of uranium produces the same amount of heat energy as 1,500 tons of coal, he pointed out, adding:

"The energy requirements of a city such as Richmond could be met by the use of a pound or two of fissionable materials a week."

At 2:15 p. m. came the opening of what was described as the Nation's first atomic age show, "Atoms for Peace," including some twenty-five exhibits demonstrating research and development in the field of commercial use of atomic energy.

USE DEMONSTRATED.

The show, in the breezeway beneath the city hall, will be open to the public from 10 a. m. to 9 p. m. daily through next Sunday. Tours of the displays have been planned for more than 10,000 Contra Costa County school children.

Every hour throughout the day, and throughout the week, Atomic Energy Commission films on peaceful uses of atomic energy will be shown in the Bermuda Room of the civic auditorium.

Bay area communities and industries, as well as universities and research centers, will be honored during the week. Governor Goodwin J. Knight will address a civic luncheon in the auditorium at noon on Thursday.

A parade at 7 p. m. Saturday, and a dance at 9 p. m. in the auditorium, will bring the festivities to a close, but the "Atoms for Peace" displays will remain open to the public until 9 p. m. Sunday.

Nobel Winner At Richmond Atomic Show

S.F. Chronicle 10/3/55

Energy requirements of a city the size of Richmond may eventually be met by using only a pound or two of fissionable material a day, a Nobel Prize winner predicted yesterday.

Dr. Glenn T. Seaborg, University of California professor of chemistry and one of the discoverers of plutonium, spoke at opening ceremonies of a week-long "atoms for peace" exposition in Richmond.

"It will never be possible to use nuclear energy devices for the propulsion of automobiles because of the weight of the shielding material," he said, "but it will be possible to use them for boats and large airplanes."

Dr. Seaborg repeated an earlier plea for a greater expenditure for basic research in the United States, not only for defense purposes, "but because our whole economy is rapidly becoming tied closely to continued technological advance."

Today—Oakland Day at the show—thousands of East Bay schoolchildren will tour the 25 exhibits of peacetime atomic uses at the Richmond Civic Center.

Exhibits will be open from 10 a. m. to 9 p. m. through next Sunday. The exposition is a high light of the city's Golden Anniversary celebration.

Richmond Celebrates

Oakland
Tribune
10/3/55

Oakland, Education Honored Today After Yesterday's Golden Year Salute to Pioneers and Atom Power

HARD TO PRODUCE.

The element, Seaborg said, was almost impossibly hard to produce in volume, since after each bombardment, the experimenters ended with just one atom.

By way of defining the size he said it would take 1,000,000,000,000,000,000 (that's twenty-four zeros) such atoms to make a pound of the substance.

For the future, Seaborg said, it seems likely that additional elements up to No. 106 may be added to the table.

Beyond that, he guessed no others would be found, since they would disintegrate too fast to be pinned down and labeled.

\$1,000 FUND.

Seaborg recalled the time, back before 1940, when a generous Government provided a check for \$1,000 to aid the Berkeley scientists in their attempts to gather enough plutonium for laboratory study.

Accompanying the check was a glowing letter, predicting that some day the Government might spend as much as an amazing \$1,000,000 on such research.

Before the war was over the Government had expanded \$2,000,000,000 on atomic research, at least half of it on the development of plutonium.

RICHMOND, Oct. 3 — The city's celebration of its golden year—launched yesterday with tributes to pioneers and atoms—continues today honoring Oakland and education.

Approximately 650 persons gathered in the Memorial Auditorium for the Pioneer Luncheon yesterday which saluted the early residents of Richmond.

Later, in the Civic Center Plaza, a Navy bomber roared low over the crowds and a small ground explosive was set off, officially opening the Atoms for Peace Show. The show consists of 27 exhibits around the plaza and will continue during the week-long celebration.

Dr. Glenn T. Seaborg, associate director at the University of California radiation laboratory and winner of the 1951 Nobel Prize in chemistry, was principal speaker at ceremonies opening the Atomic Age Industrial Show, the first of its kind in the United States.

PEACETIME A-POWER

Dr. Seaborg, holding what he said was one pound of uranium in his hand, brought home the potential application of peacetime atomic power by noting, "This uranium can release heat energy equivalent to 1,500 tons of coal. One or two of these a week could take care of all of Richmond's power needs."

The noted scientist said the "real promise of atomic energy transcends its use as a weapon." He pointed out that the use of the power in industry, medical research and therapy, biochemistry, metallurgy, agriculture, zoology and other fields is practically limitless.

Some day, Dr. Seaborg declared, the power of the atom will drive planes and ships all over the world. He added, however, "It will never be possible to use atomic energy for driv-

ing automobiles because of the weight of the required shielding materials."

In this same vein, the U.C. scientist said, two problems have to be overcome in use of atomic energy: disposal of radioactive waste and the large quantity of shielding materials necessary.

ATOMIC RESEARCH

Greater participation in atomic research and development by private industry is now possible, Dr. Seaborg said. One thousand radioactive substances are known today and "not only will the average man profit from them, but so will all of humanity." He called for more education in atomic energy, declaring, "education is a way of working our way out of the world dilemma."

He was introduced by Dr. Harold A. Fidler, manager of the San Francisco Operations of the Atomic Energy Commission. Earl Darfler, coordinator of the Atoms for Peace Show, was master of ceremonies.

Augustin S. Macdonald, at the plaza ceremonies offered his congratulations on the city's 50th anniversary. Macdonald is founder of the city. "It hardly seems possible," he said, "that 50 years ago I stood near this very spot and looked over a hayfield." He repeated his prediction that Richmond would one day have a population of 500,000.

James N. Long, former Contra Costa County sheriff and a public official for 40 years, traced the history of the city at the Pioneer Luncheon.

BIRTHDAY CAKE

Miss Selena Ellis, born here 88 years ago, cut the city's birthday cake. Atty. T. H. DeLap, former state senator and master of ceremonies, said Miss Ellis is believed to be the oldest living native of Richmond. She was escorted by Walter T. Helms, the first superintendent of Richmond's public schools.

Mayor John Sheridan welcomed visitors to the celebration in behalf of the city and Supervisor Ivan Goyak represented Contra Costa County. The county was honored in ceremonies during the evening.

Today school children from the Bay Area are touring the atomic exhibits and scientific papers are being read in the council chambers. Films, concerts, ceremonies honoring Oakland and other activities highlight the day.

THE SHELL DEVELOPMENT RESEARCH CLUB
MEETING ANNOUNCEMENT

Time: Thursday, October 27, 8:00 P.M.
Place: Hillside Club, 2286 Cedar Street, Berkeley
Speaker: Professor Glenn T. Seaborg
Subject: TWELVE DAYS AT GENEVA

Professor Seaborg was an official U.S. representative to the recent Geneva Conference on Atomic Energy. His talk will be based on his experiences and observations at these important meetings.

Glenn T. Seaborg graduated from UCLA in 1934 with a BA and received his PhD degree in chemistry from the University of California at Berkeley in 1937. He remained here advancing successively from his original position as an assistant to Professor G. N. Lewis through Instructor and Assistant Professor to become a Professor in 1945. He has been active in radiochemistry and nuclear research since graduation and was associated with the Manhattan Project at the Metallurgical Laboratory in Chicago from 1942 to 1946. He has participated in the discovery of all of the transuranium elements and in 1951 received the Nobel Prize in Chemistry (jointly with Dr. Edwin M. McMillan) for outstanding work in this field. His endeavors have led to more publications and patents than can reasonably be comprehended. Besides this he has been active in various scientific and fraternal organizations including the American Chemical Society in which he served as a Councilor-at-Large. Presently he is a Councilor for the California Section. His activity and fruitfulness in other spheres is indicated by the fact that he is the father of five children. He is also interested in sports, being Faculty Representative on the Pacific Coast Conference.

L. A. Examiner (12/23)
**Seaborg Sees
Atomic Ships
in 10 Years**

Nobel Prize Winner Glenn T. Seaborg of the University of California predicted here yesterday that within 10 years most ocean-going ships will be powered by atomic engines.

"The value of such power plants for large seagoing vessels will be great because of the almost unlimited cruising ranges they make possible," Dr. Seaborg, co-discoverer of the element plutonium, told the Bond Club.

Atomic power is the cheapest source of energy available, he said. One pound of fissionable material will equal 10,000,000 kilowatts of electric energy or the energy produced by burning 2000 tons of coal.

Dr. Seaborg added, however, that the heavy shielding required to protect against radioactivity in atomic engines probably would make atomic powered automobiles impractical.

Daily Cal. 11/21/55
**Seaborg to talk
on new elements**

"Man-made elements" will be the topic of a public lecture given by Glenn T. Seaborg, professor of chemistry and Nobel Prize winner, at 12:15 p.m. tomorrow in 155 Dwinelle hall.

Seaborg was instrumental in the discovery of plutonium and other transuranic elements. He was also director of a project to determine the chemical properties of plutonium, making it possible to separate it from uranium in the laboratory.



GLENN T. SEABORG
Reveals War Oddities

Hiroshima Bomb Sidetracked by Juke Boxes

By WILLIAM BOQUIST

The world's first atomic weapon, destined to level Hiroshima and end World War II, was "bumped" off a ship in San Francisco by a higher priority cargo while en route to the Pacific.

The higher priority cargo? Juke boxes for troops in the South Pacific.

This was just one of a number of "now it can be told" anecdotes related on the University of California's Berkeley campus yesterday by Dr. Glenn T. Seaborg, famed Nobel Prize winning nuclear chemist, in the course of an amusing public lecture.

Overseas Call—

He told, too, of the time when Robert Oppenheimer, who was in charge of the atomic developments was awakened late at

How Juke Boxes Put 1st A-Bomb Off Ship

night in Los Alamos by a trans-Atlantic phone call from Potsdam where President Truman was meeting with Stalin and Churchill.

This was at a time when America was still clinging to the secret of its new weapon and the United States delegation at Potsdam was holding the plutonium bomb as a last trump card.

"What about the over-pressure?" an hysterical voice demanded. "Won't the bomb blow the plane that drops it right out of the air?"

"I don't know," a sleepy Oppenheimer replied. "That's the sort of thing you'd better ask General Arnold."

"And who the hell do you think this is talking?" asked Gen. H. H. Arnold, with considerable indignation.

Then there was the proud day in September of 1942 when, after more than two years of work, Seaborg and his colleagues had assembled the first perceptible amount of plutonium, about one ten-millionth of an ounce—barely visible under a microscope.

"We were like a bunch of new fathers," Seaborg said. "I'll never forget how proud we were. We called General Groves over to the microscope to have a look while we stood around glowing."

Gen. Leslie Groves, head of the vast Manhattan Project, walked deliberately over to the microscope, bent to peer into it for a long moment, straightened and announced coldly:

"I don't see a thing."
"It is impossible to tell you," Seaborg told the audience, "how suddenly discouraged and let down we were."

Seaborg devoted most of his lecture to an interesting and sometimes amusing description of how the nine new elements discovered since the war were named.

FIRST TWO.

The first two, bombarded into life by the Berkeley cyclotron, were Neptunium (No. 93) and Plutonium (No. 94).

"Here," said Seaborg, "we simply followed the pattern set by the discoverers of Uranium (No. 92), and named the two for two other planets.

"After this the astronomers fell behind and we began to name new elements more or less to suit ourselves."

Next there was Americium (No. 95), named for this continent, as a balance to Europium

(No. 63), a similar rare earth.

No. 96 was named Curium, for Pierre and Marie Curie.

The next two, Nos. 97 and 98, were named Berkelium and Californium to celebrate the fame of the city and State.

LACK OF CONFIDENCE.

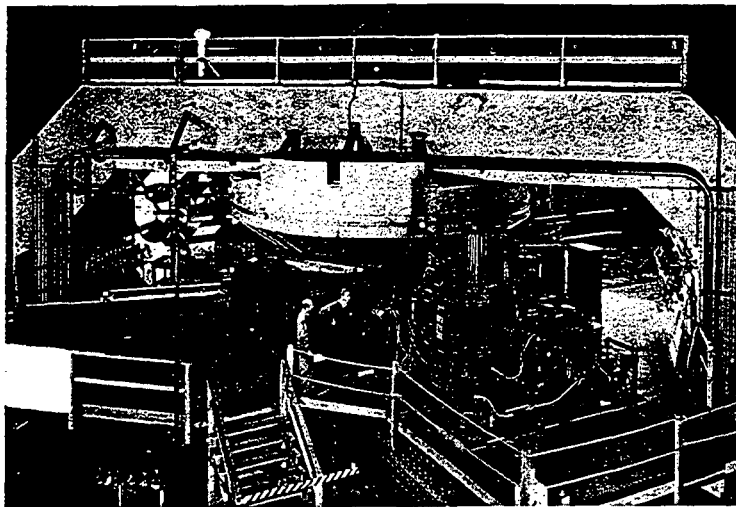
And here Seaborg reminded his audience of a piece in the New Yorker magazine which suggested that the naming of Californium implied a lack of confidence on the part of the Berkeley scientists.

If they had been sure of discovering at least two more elements, the article said, they would have named the new element Universitium, reserving the names "ofium" and Californium for the next two.

The next two new elements, Einsteinium (No. 99) and Fermium (No. 100) were discovered in the debris of the country's first thermonuclear bomb, exploded in the Pacific in November, 1952.

They were named, of course, for two of the most famed of all physicists, the late Albert Einstein and Enrico Fermi.

The last of the new elements, Mendeleevium (No. 101) was named for the man who first drew up the periodic table of elements, and who was content to end it with No. 92.



Part of the cyclotron, Seaborg's workshop.

How We Can Use Atomic Energy

Dr. Glenn T. Seaborg explains
its manifold uses.

By Cedric Larson

TEN years after Hiroshima, and 13 after man first split the atom, 1,200 atomic scientists from 72 nations filled Geneva's huge Palace of Nations in mid-August 1955, with exciting talk about future peaceful uses of the atom. The first International Conference on Peaceful Uses of Atomic Energy was a gathering of enterprising and farseeing men who had caught a vision of peaceful atomic development on a global scale.

One of America's topflight scientists, Dr. Glenn T. Seaborg, Nobel-prize winner, professor of chemistry at the University of California, and associate director of the Radiation Laboratory in Berkeley—was sent to Geneva as an official member of the American delegation. Dr. Seaborg is one of the world's foremost nuclear chemists, and an ex-

pert in a new field that is called ultramicrochemistry. He was chairman of the Section on Transuranium Elements on August 12th when the names for elements 99 and 100 were used for the first time—Einsteinium (after Albert Einstein) and Fermium (after Fermi). Element 101 was formally named Mendelevium after D.I. Mendeleev, Russian chemist, 1834-1907, who developed the periodic chart of the elements.

Those three most recently discovered elements were found as the result of a magnificent research design, constructed and developed by Dr. Seaborg and his associates at the Radiation Laboratory in Berkeley. Their discovery was warmly acclaimed by every delegate at the conference. The Russian scientists seemed deeply touched by the naming of element 101 after their hero Mendeleev, and many seemed to want to express those sentiments personally.

Also warmly received was the University of California Radiation Laboratory exhibit at the Palace of Nations of compounds of neptunium, americium and plutonium—set up under the direction of Dr. Seaborg. There for the first time was a public display of the first plutonium oxide (a thousand times more precious than gold) isolated in 1942 by Dr. Seaborg and his associates, Drs. B. B. Cunningham and L. B. Werner, working at the Metallurgical Laboratory of the University of Chicago.

Dr. Seaborg could not say that the Russians are ahead of the United States but he reported that they have

made excellent progress in nuclear research. They evidently have nuclear scientists of high caliber and no shortage of science students such as faces the United States. Seaborg believes the free world can expect real competition from Russia. He finds two important aspects of the peacetime applications of nuclear energy: 1—its application to industrial power uses, and 2—the use of the by-product radioactive material for important research in medicine, biology and other scientific fields.

The Berkeley scientist says that for the first of these there are the "fissionable materials" plutonium and the isotopes of uranium known as uranium-235 and uranium-233, which will be utilized as fuel in especially designed nuclear energy machines. To underscore the tremendous energy potential of nuclear fission, Dr. Seaborg points out that one pound of fissionable material is equivalent in heat energy to about 10 million kilowatt-hours of energy, or to the heat energy obtained by burning about 1,500 tons of coal. But there are a number of rather baffling engineering problems to solve before this can take place. Seaborg believes that these problems will be solved by the research skill of America, and a nuclear energy industry probably will be developed in the future because of the advantages of this form of energy.

In fact, he points out, with the recent commissioning of the submarine Nautilus and the well-advanced plans for its sister submarine, the Sea Wolf, great progress already has been made in put-

Dr. Glenn T. Seaborg.

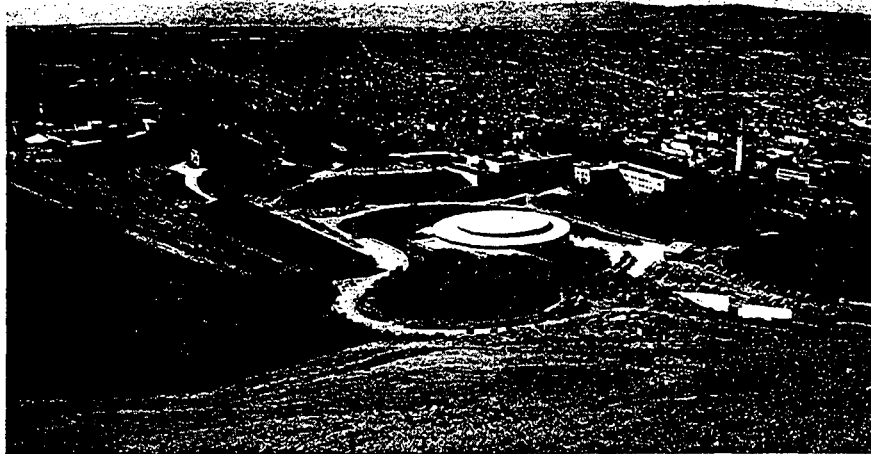


ting nuclear energy power plants into submarines. The value of such power plants to large seagoing vessels will be great because of the almost unlimited cruising ranges which they make possible. "I therefore feel that it is entirely possible that in the course of 10 years or so, we may reach the place where very few new large capital ships will be launched without nuclear power plants," he says.

While we are on the threshold of an atomic industrial age, the University of California chemist feels that we should go slow in predicting whether nuclear energy will be able to compete in cost with other forms of energy, such as coal. To be competitive in America, on the average, the overall cost will have to be at the cost bracket of six to seven mills per kilowatt hour of energy. Some atomic engineers feel that this is possible, but other equally competent engineers are dubious. The cost of electrical energy varies widely from place to place; it seems only common sense to look for industrial applications of nuclear energy in those places where electrical costs at present are greater, so that nuclear energy will be competitive there. Irrespective of the cost situation, Seaborg declares, nuclear energy will be important because of its concentrated form and therefore its ability to accomplish things that no other form of energy can do at any price.

The second peacetime application of atomic energy is the use of the by-product radioactive substances in research work for atom-tagging experiments. In atom-tagging or tracer studies as they are sometimes called, an element in its stable form is tagged or labeled by mixing it with a radioactive form of the same element. Then the course of the element, for example, through the human body or in a chemical reaction, can be followed quite easily by observing the course or path of the radioactivity in the system. It often is possible to do things by the atom-tagging method that cannot be done at all by other methods.

"Today there are about 1,000 radioactive substances known, most of them made radioactive by artificial means, that is, by bombardment with nuclear particles," says Dr. Seaborg. "The nuclear energy



Radiation Laboratory at University of California.

piles developed during the war are better sources than had previously existed and they have greatly reduced the cost of radioactive substances. The Oak Ridge National Laboratory in Tennessee during the last seven years has made about 40,000 shipments to medical institutions, hospitals, universities and public and private research institutions throughout the world. Research work using these radioactive substances from the United States is going on in hundreds of laboratories in about 25 different countries. Radioactive material also is being made available to the laboratories of the world from the atomic energy reactors in Canada, England, France, Norway and Sweden."

Dr. Seaborg believes that the greatest service to humanity in the long run from nuclear energy may come from the use of these radioactive materials. Probably the greatest help will come from their application in medical therapy and diagnosis and in biochemical and medical research. It is possible to determine the site of action of therapeutic agents, to decide which form of a new drug is absorbed most readily from the gastrointestinal tract, and to identify and thus be able to produce in the laboratory new chemical compounds of biochemical or medical value. The incorporation of radioactive substances into the molecules of those great substances, the sulfa drugs, and also the antibiotics, such as penicillin and streptomycin, is leading to a better understanding of how they work.

"Other fields include many branches of chemistry and physics, agriculture, plant physiology, metal-

lurgy, zoology and several branches of industrial research," concluded Dr. Seaborg.

Glenn Theodore Seaborg was born in the little mining town of Ishpeming, Michigan, in 1912, of Swedish parentage. His mother was born Selma Erickson in Grangesberg, Sweden, and went to the United States when she was 17. His father was born in Ishpeming of Swedish immigrants. At the age of 10 his family moved to Home Gardens, California, which is now part of South Gate (near Los Angeles) where his parents still reside. In the David Starr Jordan High School (1925-29) he decided that chemistry and physics held more interest than other fields, and excellence in scholarship made him valedictorian of his high school class. He began his college life at the University of California at Los Angeles in the depression year of 1929.

By 1931 Seaborg was able to secure a job in the chemistry laboratory at U.C.L.A. where he prepared samples and did research and teaching. His assistantship schedule was very heavy from then until graduation. During his courses at the university, nuclear physics and chemistry captured his imagination, and during his junior year he was elected to Phi Beta Kappa. In 1934 he received his A.B. from U.C.L.A. and transferred to the University of California in Berkeley. There in 1937 he earned his Ph.D., his thesis subject concerning the inelastic scattering of fast neutrons. The following two years Seaborg was laboratory assistant to the late great Dr. Gilbert New-

(Continued on page 20)

ENERGY

(Continued from page 11)

ton Lewis, then dean of the College of Chemistry on the Berkeley campus. They published several scientific papers jointly. Seaborg profited greatly from this association with one of the greatest scientific geniuses of our time.

In 1939 Seaborg received his appointment from the University of California as an instructor, and in 1941 he was promoted to the rank of assistant professor. During this period Seaborg and his associates discovered several dozen isotopes. An isotope is one special form of an element. The isotopes of any element behave the same way, but differ slightly in atomic weight. He and his associates published some 40 scientific papers as the result of their discoveries.

The fruit of their labors, however, culminated in the discovery (1940) of a new element—plutonium—(element 94)—which was to become the first synthetic element ever to be seen. The importance of plutonium became apparent when it was found that one of the isotopes of the element was fissionable.

This meant that it could be used as a source of atomic power, although plutonium would have to be produced in sufficient quantity and the chemists would have to learn the chemistry of the new element and learn how to separate it from uranium and the fission products.

Seaborg and his group were also responsible for the discovery of the other atomic energy isotope, U-233, which is formed from the action of neutrons on thorium and which has opened the possibility for the indirect use of thorium in atomic power. They also found the existence of small amounts of plutonium in nature in such ores as pitchblende and carnotite.

Heads of the Manhattan Project, which produced the first atom bomb, decided the plutonium work should be undertaken at the University of Chicago Metallurgical Laboratory; so Seaborg secured a leave of absence from the University of California to go to Chicago in April, 1942. Seaborg remained at the Metallurgical Laboratory from April 1942 to May 1946 as chief of the section working on the transuranium elements. Here one

of his main responsibilities was working out the complete chemical process for the separation at Oak Ridge, Tennessee, and Hanford, Washington, of plutonium from the mixture of uranium and intensely radioactive fission products.

Seaborg was chosen for this assignment on the basis of his reputation. When the Government called him to Chicago to lead the chemical project on plutonium, Seaborg brought with him a group of even younger University of California associates who had been co-workers in nuclear chemistry on the Berkeley campus. They formed the nucleus of the great plutonium team as it expanded to over 100 scientists under Professor Seaborg's supervision.

As late as 1942 it was estimated by some very responsible scientists that it would not be possible to learn enough about the chemistry of plutonium to design a process in less than five years, but the process was designed by Seaborg and actually put into operation to such an extent that it was possible to produce atomic bombs from plutonium a little over three years from

the time Seaborg first came to Chicago.

The success of the work was due to Seaborg's ability as a scientist, coupled with his very unique ability as a designer and a director of work. He was outstanding among his colleagues as a man who was able to direct his efforts toward the important goal and avoid any waste of the limited manpower on side issues.

As a director he showed a great deal of imagination and daring in embarking on a program of ultramicrochemical research, working with quantities a thousand-fold smaller than those which had been considered standard microchemical quantities before. It was only by using these novel and unusual techniques that it was possible to make some of the essential chemical tests on plutonium at a time when only microgram quantities were available.

During his stay at the Metallurgical Laboratory, Seaborg and his associates also discovered two more transuranium elements: element 95 Americum was discovered during late 1944 and element 96 Curium during the summer of 1944.

While he was still on leave from the University of California, the university promoted Seaborg from the rank of assistant professor to that of a full professor (1945)—skipping the rank of associate professor. In May, 1946, Seaborg returned to the University of California to assume his position in the chemistry department and to take responsibility for the direction of the chemical research in the radiation laboratory of the university.

After his return to Berkeley he undertook further research on the transuranium elements and on the identification of various nuclear reactions induced as a result of the operation of the Berkeley 184-inch cyclotron. He also directs the work of a group of graduate students in the field of nuclear chemistry as well as teaches lecture courses in that field.

In his postwar research, Dr. Seaborg and his colleagues have discovered element 97 Berkelium, element 98 Californium; and more recently, as we saw earlier in this article, element 99 Einsteinium, element 100 Fermium and element 101 Mendelevium. The choosing of

names for new elements is no simple task, and they usually are chosen to honor a great scientist or some place name which has figured in the atomic discoveries.

Dr. Seaborg explains that these elements are designated transuranium because they all have heavier weights than uranium, its atomic number of 92 once thought to be the heaviest. Many of these transuranium elements were created with the 60-inch cyclotron. As early as 1944 Seaborg developed a theory as to what chemical proper-

ties of all elements through 103 should be—a "new rare earth series." His predictions have been borne out all the way through 101 so far, and they have been extremely accurate as to their chemical properties.

Seaborg and his colleagues also have discovered a new phenomenon of high energy bombardment called "spallation." Ultra high energy particles from the giant cyclotron knock out of heavy nuclei up to 40 or more particles. A study of

(Continued on page 22)

ENERGY

(Continued from page 21)

the nuclear debris of these bombardments has revealed the presence of radioactive isotopes of common elements that cannot be made in any other way.

One of Seaborg's more important contributions to science was his recognition that the heavy elements form a transition series of "actinide" elements in a manner analogous to the rare earth series of "lanthanide" elements. This concept demonstrated for the first time how the heavy elements fit into the periodic table and therefore their relationships to the other elements.

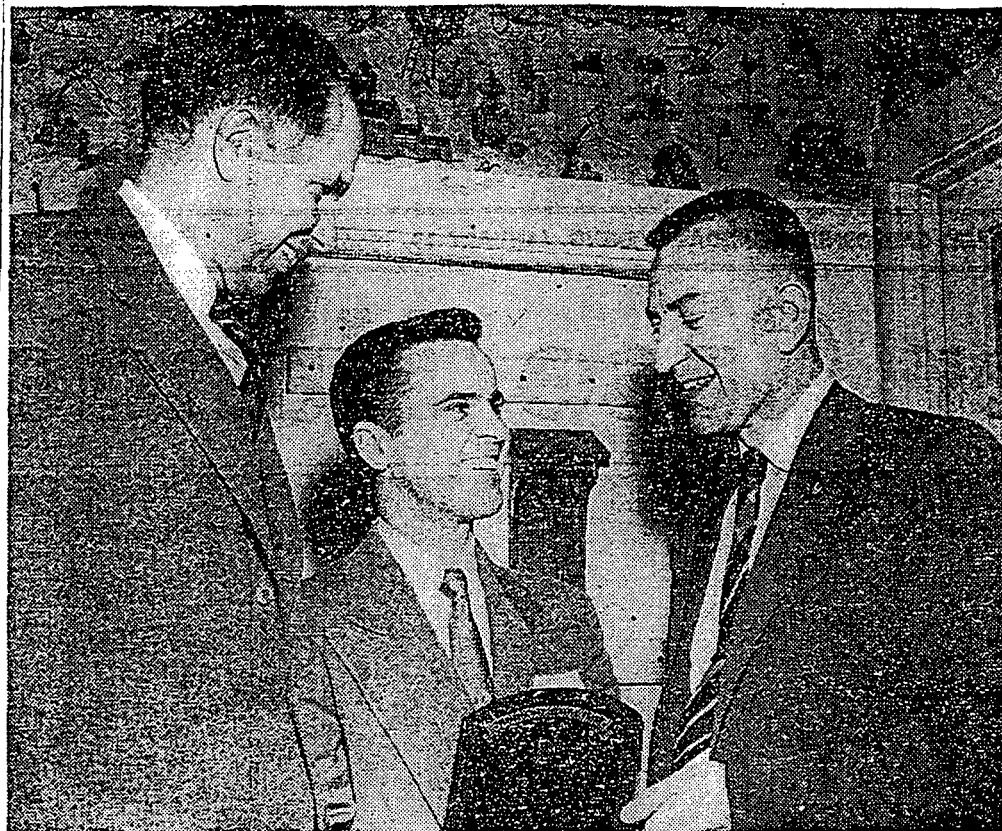
It enabled Seaborg to predict very precisely the chemical nature of transuranium elements from element 95 through element 118, and thus to extend the periodic table through element 101. In that it systematizes and unifies the momentous individual discoveries of the Radiation Laboratory and contributes to our larger understanding of nature, this concept lends to Seaborg's work a distinction that is achieved rarely in science.

Seaborg's publications now total about 150 and include the compilation of complete tables of isotopes, review articles on artificial radioactivity and the applications of tracers to chemistry as well as a large number of papers on artificial radioactivity and problems in nuclear physics and chemistry. He has edited several of the ponderous and technical volumes in the National Nuclear Energy Series, sponsored by the Atomic Energy Commission.

One of Seaborg's greatest honors came from Sweden. In 1951 he was declared the co-recipient (with E. M. McMillan) of the Nobel prize in chemistry. *End*

FOR ATOMIC POWER

The Swedish ASEA Electric Works is studying the possibilities of producing heavy water in order to meet the expected increase in demand in conjunction with the possible construction of atomic power plants in Sweden, according to a statement by the company's managing director Åke Vrethem. Preliminary investigations have shown that heavy water can be produced locally at a cost as low as \$60 a kilogram, or about the same as that which Americans will offer, according to their reports at the Geneva Atomic Conference.



Dr. Gregory R. Choppin, center, 28-year-old University of California Radiation Laboratory nuclear chemist, receives El Cerrito Junior Chamber of Commerce "young man of the year" award. Nobel prize winner Glenn T. Seaborg, director of laboratory, stands at left as plaque is presented by Jack Davis, Jaycee president. Choppin lives at 438 Clayton St., El Cerrito.

Apathy Among Science Teachers Deplored

Lack of Inspiration Blamed For Student Shortage

By WILLIAM BOQUIST

All of the grave superlatives—"crisis," "calamitous," "disaster" and others—have been applied to America's shortage of scientists but they will not stampede our high school youth into science careers.

It will have to be done by the inspiration of teachers.

Such at least is the conclusion of several scientists who have dedicated themselves to the job of trying to persuade more young people into their fields.

LACK OF INSPIRATION.

"It is not primarily from lack of instruction, but from lack of inspiration where the scientist is lost," says Glenn T. Seaborg, Nobel laureate in chemistry.

"We are seriously short of teachers in love with their subject."

Seaborg's own choice of a career was inspired by his teacher in Los Angeles' David Star Jordan High School, a decision that sent him on to nuclear chemistry and world fame as a discoverer of man-made chemical elements.

Nearly all studies, Seaborg says, show a serious loss of potential scientists and engineers in the step from high school to college.

The supply could be doubled if the loss could be reduced at this point, believes Raymond T. Birge, emeritus professor of physics at the University of California and former chairman of the department.

MATTER OF FINANCES.

Less than half of the high school graduates enter college, he points out.

"The students need to be supported. In general it is just a matter of finances."

With Russia turning out scientific and technically trained manpower at a rate far greater than ours, these men warn that unless America steps up its own training radically, we may fall behind.

"The problem is far broader than our defense," according to Seaborg. "The development of our whole national economy depends on science, which is the twentieth century frontier."

Seaborg likes to refer to the things science has produced in his own lifetime—he is 43—actually only a few of them—radio, television, radar, aluminum, nylon, plastics, hormones, antibiotics, vitamins, calculating machines and atomic energy, with which he has had a significant role.

"The problem now is in the greatly increasing speed, even over that of just two or three decades ago, with which discoveries can be put into practical application."

RUSSIAN PLAN.

In Russia, Seaborg says, 250,000 students enter freshman courses in science every year. They are chosen from 2,500,000 applicants in comprehensive aptitude tests and supported, if necessary through their years of training.

Comparison are so great when they get out that they don't need any more. They are the elite, the highest paid in any class in Russia, including industrialists, but probably not the politicians.

"Not all this would be proper in America, but we do need to provide more money for the young scientist—rewards, recognition, creation of an atmosphere of understanding that he is making an important contribution."

It has become axiomatic, as Morrough P. O'Brien, dean of the college of engineering at Berkeley, puts it, that "the future development of the country is going to require a larger fraction of the population with a technical education."

Because scientists lay the groundwork for the technological advances that have made the United States a great Nation, The Examiner has concerned itself with indications of a growing shortage of scientists. The following is the last of three articles by William Boquist, Examiner staff writer, dealing with the problem.

CHANGE IN ATTITUDE.

Along with it, he believes, must go a change in the present snobbish attitude that going to a university is better than attending a State college.

"It's different," he says, "but it isn't any better."

"Higher salaries for high school teachers are absolutely necessary," Edward Teller, described as "Father of the H-bomb," says. "But they alone won't do the job."

"A good teacher is not one who knows how to teach and not necessarily one who knows his subject well. To know how to teach helps, and to know the subject you are teaching helps much more, but they are not essential."

"The only essential thing is that teachers love their subject completely."

"We are descended, as we all know, from simians, and if the kids see someone having fun they will want to share in it."

sis on precision, and much too much on the ease with which it is necessary to absorb a subject, so that students won't strain their brains.

"We won't have good scientists until we get over the idea of intellectual accomplishment."

"Teachers never give kids anything to dig their teeth into. If the student does it himself he is not appreciated by his fellows, or even by his teacher. And that is a scandal."

"Unfortunately," Teller says, "it is the young person's idea in this country that one does not become a scientist unless he is already somewhat peculiar."

"Everything for the masses carries a certain stigma. Science is difficult. This being difficult, talking a difficult language is resented."

Tuesday, January 31, 1956

Daily Cal.

Sproul honored on television show

A glittering glimpse into the accomplishments of the University, presented by five famous members of the faculty, headlined a TV salute last night to the 25th year of Robert Gordon Sproul as President of the eight-campus University chain.

The KRON-TV show, "Science in Action," departed from its usual format to honor Sproul against a background of scientific, agricultural and historical achievements, a sample of what has been accomplished at the University under the leadership of Sproul.

Two of the six Nobel prize winners on the University faculty demonstrated striking laboratory achievements.

George P. Hammond, director of the renowned Bancroft library of history, showed the world-famed Drake plate, the plaque that Sir Francis Drake posted near San Francisco bay in 1579.

Norman B. Akesson, the only non-Berkeley faculty member to appear, demonstrated the work of the Davis campus on spray drift, an agricultural aviation research project.

Nobel prize winners Glenn T. Seaborg, co-discoverer of plutonium, and Wendell M. Stanley, director of the University's Virus laboratory at Berkeley, demonstrated accomplishments of fundamental importance in their fields.

Seaborg, described as "one of the world's great scientists" by Chancellor Clark Kerr, who was hosting the tribute to Sproul, showed films which demonstrated the methods used to make and identify the nine elements which do not occur in nature.

Stanley showed two of the discoveries at the Virus laboratory which have contributed fundamentally to the world's knowledge of how viruses grow, multiply, and

mutate, and thus to the knowledge of how to control the disease-causing viruses.

The first great achievement was the crystallization of polio virus, the first time a virus had been successfully crystallized. According to

Stanley, this research will make the polio vaccines much more effective.

The second accomplishment, and possibly the foremost scientific discovery of 1955, according to Kerr, was the reconstitution of living viruses from non-living, inactive components, the creation of life from non-living substances.

Sproul, introduced at the end of the program, said he "lapped up" the praise, but all in the spirit given: that the reputation of the University is the product of many men, and "I thank God every night that I have been given the precious opportunity to serve this institution for so long."

CHAIN-REACTION OF DISCOVERY

Broadcast # 3461 - U.E. 1147

Wednesday, February 15, 1956

Mutual Broadcasting System

KHJ, Los Angeles, 8:00 p.m.

KFRC, San Francisco, 10:00 p.m.

EXPLORER: The new chemical elements created by man in the past 15 years existed once before. They were present very briefly when the universe was created, perhaps four billion years ago.

ANNOUNCER: The University of California welcomes you to its one thousand, four hundred 47th broadcast featuring the University Explorer. He talks with a distinguished atomic scientist about chemical elements -- and especially about some new ones which were only recently discovered -- in a transcribed interview entitled "Chain-Reaction of Discovery". Here is Hale Sparks, the University Explorer.

EXPLORER: In today's atom-conscious atmosphere, most people have at least a vague idea of what plutonium is. It's a chemical element, quite heavy, radioactive, capable of being split and thus releasing energy. It was the explosive ingredient of the Nagasaki bomb, and it's assuming great importance in peacetime as a fuel for atomic reactors. It's hard to remember that before 1940, no one had seen or heard of plutonium. It was just a nameless abstraction in the minds of a few scientists.

In the studio with me is the scientist who was chiefly responsible for the discovery of plutonium. He is Dr. Glenn T. Seaborg, professor of chemistry on the Berkeley campus of the University of California. In 1951, Dr. Seaborg shared the Nobel Prize in Chemistry with Dr. Edward McMillan, professor of physics at Berkeley. They were honored for their leading role in producing the transuranium elements -- elements heavier than uranium. Dr. McMillan initiated this work and discovered the first of these new elements -- neptunium, number 93 in the periodic table. Dr. Seaborg and his co-workers followed with number 94 -- plutonium. Dr. Seaborg also developed a new principle of chemistry which made it possible to predict the existence and even the properties of a whole series of new elements. He heads a group of nuclear chemists in the University's Radiation Laboratory; these scientists have discovered, or helped to discover, each of the new elements that followed plutonium. Because of this work, we now know that there are not just 92 chemical elements, but at least 101. Dr. Seaborg is also known as a teacher of young scientists, and as an authority on the peacetime applications of atomic energy. He was one of the American technical advisers at the atoms-for-peace conference in Geneva last summer, and followers of intercollegiate sports know Dr. Seaborg in yet another role; he's the Berkeley campus faculty representative to the Pacific Coast Conference.

Dr. Seaborg, what was it that set scientists on the trail of the trans-uranium elements?

SEABORG: During the Twenties and Thirties, as more was learned about the structure of atoms, a number of scientists began to speculate about the possibility of undiscovered elements. As you know, an atom is the smallest particle of matter that can be identified as an element. But atoms are made up of even smaller particles -- mainly protons, neutrons and electrons. The number and arrangement of these particles determines the properties of an atom -- whether it is one of copper, say, or

one of lead. It seemed possible that one might rearrange an atom -- take away some particles or add some, perhaps. Actually, before any of the transuranium elements were discovered, a bit of unfinished business was cleared up from previous years. The first synthetic element was not an addition to the list, beyond uranium; rather, it filled a gap in the existing periodic system.

EXPLORER: As I understand it, the periodic table is an orderly arrangement of the elements, according to their properties and -- to read it another way -- according to their atomic number. That is, according to the number of protons in their atomic nuclei. And you say the first synthetic element filled a hole in the periodic table -- a place where there should have been an element according to theory but where none had been found.

SEABORG: That's correct. The first synthetic element was technetium, number 43; it was synthesized in the 60-inch cyclotron at Berkeley in 1937. Since then, the 3 remaining gaps in the old periodic table have been filled.

EXPLORER: It was in 1940, I believe, that the first transuranium element was identified. How did that come about?

SEABORG: Dr. McMillan had been studying the results of the fission, or splitting, of uranium -- a process which had just been discovered in Germany. Fission was accomplished by bombarding uranium atoms with neutrons. These experiments produced considerable radioactive debris, including one new and unknown substance. Further research identified it as a new element -- number 93, which was named neptunium.

EXPLORER: And that was the first of the transuranium elements. Next, I believe, came plutonium, which you identified and which is the best-known of the man-made elements. Could you tell us something about that?

SEABORG: Plutonium was produced in a similar way to neptunium -- by bombarding uranium in the 60-inch cyclotron. We used a different kind of missile, however -- the deuteron, which consists of a proton and a neutron. This caused some of the uranium first to become neptunium and then to decay into plutonium -- element 94.

EXPLORER: But to get enough plutonium to be usable as a fuel or as an explosive, you must have a practical way of converting uranium into plutonium on a large scale.

SEABORG: That's right, and you can't do it in an experimental acceleration chamber like the cyclotron. You must be able to set off continuous, self-perpetuating fission in a large quantity of uranium. That way, the uranium does the conversion job itself, so to speak. Working out ways to start such a chain reaction was one of the problems we tackled during World War II, and it's the basis of much of the peacetime work in atomic energy. But that's another story.

EXPLORER: It's a story I'd like to come back to in a moment; but let's talk first about the other transuranium elements -- 95 through 101. Were they produced in nuclear bombardments like those you've described?

SEABORG: The majority were, although the targets and missiles varied from one experiment to the next. Sometimes, in fact, we needed one synthetic element in order to make another. For example, plutonium was the target in the synthesis of curium, element 96. And curium was bombarded in order to make californium, element 98. The discovery of elements 99 and 100 followed an experiment which was very little concerned with the identification of new substances.

EXPLORER: What experiment was that?

SEABORG: It was a thermonuclear test explosion carried out in the Pacific Ocean late in 1952. Among the substances found in the radioactive debris were two previously unknown ones. These substances were studied by scientists at the Berkeley Radiation Laboratory, the Argonne National Laboratory, and the University of California laboratory at Los Alamos, New Mexico. These studies identified the new substances as elements 99 and 100. Later, scientists from the University succeeded in producing these elements artificially, in the Atomic Energy Commission Reactor at Arco, Idaho. Element 99 has also been produced in the 60-inch cyclotron at Berkeley.

EXPLORER: The latest of the new elements is number 101, I believe.

SEABORG: Yes, that is mendelevium, which was produced in the 60-inch cyclotron last year. Most of the transuranium elements have been made only in tiny quantities, and this is especially true of mendelevium. Only 17 atoms of it were produced in the discovery experiments.

EXPLORER: Dr. Seaborg, when we speak of new elements, does this mean they never existed until man manufactured them?

SEABORG: Not exactly. We believe that all such elements, even including those that remain to be discovered, were part of the universe when it was created. But creation was four billion years ago or more, and the transuranium elements are highly unstable and radioactive. All of them disappeared -- some within a matter of minutes -- and they no longer exist in nature.

EXPLORER: To me, one of the most striking things about this research is that you were able to predict what these new elements would be like, even before they were discovered. I understand these predictions were based on your own actinide theory. Could you tell us about that?

SEABORG: The actinide series of elements begins with number 89, actinium, and it includes the transuranium group. There's a pattern of similarity between the actinide elements and the previously-known lanthanide series of rare earths. Each of the actinide elements has an opposite number, so to speak, among the rare earths. This pattern of similarity is the key to our prediction about the elements beyond uranium.

EXPLORER: Dr. Seaborg, you and your colleagues have had what must have been a rather pleasant problem in connection with this research. How did you go about choosing names for the new elements?

SEABORG: Well, the choice of neptunium and plutonium was easy. The names are taken from the planets Neptune and Pluto, which are immediately beyond Uranus in the solar system; and uranium, of course, is named for Uranus. Element 95 is Americium, for the American continents. This seemed only fair, since the corresponding element in the rare earth series is Europium. Number 96 is curium, named for Pierre and Marie Curie. Curium's opposite number in the rare earth series is gadolinium, also named for a scientist. Number 97 was named Berkelium, in honor of the city where the work was done. Berkelium's corresponding rare earth, terbium, was similarly named, for a city in Sweden.

EXPLORER: All very orderly and logical, so far.

SEABORG: Yes -- although at one point someone suggested we name a couple of elements

delirium and pandemonium. With number 98, we stretched a point and chose the name Californium, in honor of the state and the University. Element 98's opposite number in the rare earth series is dysprosium, which comes from the Greek for "hard to find". We can fit californium into our previous naming pattern only by pointing out that the early settlers found California hard to reach! The three most recent transuranium elements have been called einsteinium, fermium and mendelevium. The first two names were chosen to honor the great modern physicists Albert Einstein and Enrico Fermi. Mendelevium was named for Dmitri Mendeleev, the 19th-century Russian chemist who worked out the periodic classification system on which much of our research was based.

EXPLORER: Dr. Seaborg, I know that the research on transuranium elements began as basic research for its own sake. But do these elements have many practical applications?

SEABORG: Most of them do not, except insofar as it's practically desirable to learn all we can about the structure of matter. The exception, of course, is plutonium, which has both military and industrial uses. It is one of the three elements which are potentially important atomic energy fuels for industry. The others are uranium and thorium.

EXPLORER: And it's possible, you say, to make plutonium in substantial quantities.

SEABORG: Yes; as we mentioned earlier, a spontaneous, plutonium-producing chain reaction can be set off in uranium. In fact, one type of power source -- the so-called breeder reactor -- can provide energy and manufacture plutonium at the same time. Of course, it will be a long time before atomic energy is on a par commercially with electricity, coal, and so forth. Many engineering problems remain to be overcome -- problems like extracting the enormous heat from the fission reaction. Another difficulty is the disposal of dangerously radioactive byproducts. Atomic energy may come into wide use first in parts of the world that have little access to more conventional power sources. In the United States, it may take longer for atomic energy to become cheap enough to compete with hydroelectric power.

EXPLORER: Dr. Seaborg, do you think you're likely to have the task of naming many more new elements?

SEABORG: Well, there is no reason why there can't be many more, although we know of only 101 so far. However, I doubt very much that we can identify more than up to 105 by chemical means. The rest would decay so rapidly that they'd be gone before we could study them properly. Actually, though, I'm not so much concerned now over finding new elements as I am over the nation's need for new scientists.

EXPLORER: I know the shortage of scientists is a matter of growing concern.

SEABORG: It is indeed. As a nation we simply cannot afford to stand still in science. The problem is paramount today not only because of the importance of our defense research, but also because our whole national economy is rapidly becoming geared to continued technological advance. The problems raised by science today at the midpoint of the century are greater than those of only two or three decades ago, because of the greatly increasing speed with which basic scientific discoveries can be put into practical application. This is true not only for our country but for other countries, friend and foe alike. Yet there is much evidence that we are not moving along as fast as we should. One of the most important reasons is the severe shortage of scientists and engineers in our country. We are not training them at a sufficient rate to come near meeting the demand. Practically

all studies show that a serious loss of potential scientists occurs in the step from high school to college or university. We simply must do something about teaching sound science to more high school students, and we must find means to inspire more such students to choose science or engineering as a career.

EXPLORER: I'd say that your description of your own work speaks well for the satisfaction of a scientific career. Thank you, Dr. Seaborg, for being with us.

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NOTE: If you would like to receive the Explorer's broadcasts regularly, you may subscribe to the next fifteen scripts at a cost of one dollar, which may be sent to the University Explorer, University of California, Berkeley or Los Angeles.

U.S. Science Teacher Needs Told

3/29/56

S.F. Chronicle

Science must be taught as early as the first grade if the United States is to keep its technological lead over Russia, a Nobel Prize-winning professor from the University of California said here yesterday.

Dr. Glen T. Seaborg spoke at a banquet of the San Francisco chapter of the Armed Forces Chemical Association at the Presidio.

"There are many hundreds of potential scientific geniuses whose latent talents will never be put to use," Seaborg declared, "because they fail to receive the initial inspiration."

Such inspiration can best be given, Seaborg said, by teaching science all through the school years.

"The time has come to begin teaching science as early as the first grade," he said.

In Russia, he declared, a high school graduate has had six years of biology, five of physics and four of chemistry, as well as the entire curriculum in mathematics, from algebra through trigonometry.

By contrast, Seaborg said,



ROBERT RICE
Outstanding teacher

only about one high school student of every five in the United States has had a course in physics before he graduates and only 30 per cent have studied chemistry.

"Something like half the schools in this country do not teach physics at all," he said. "Whereas in 1890 physics was one of about ten subjects, today it is one of nearly three hundred in the high school curricula."

The inadequacy of what

little science instruction is given in our schools is shown by figures in California, Seaborg said.

In 1949, 69 per cent of the science classes were taught by science majors, 20 per cent by science minors, and 11 per cent by teachers who were completely unqualified, he said.

"When we consider the well-recognized importance of scientists and science in the world of today," Seaborg said, "the neglect of the scientific disciplines in the pre-college school system presents one of the big paradoxes of American society."

Robert Rice, chairman of Berkeley High School, was the science department of named the Bay Area's outstanding chemistry teacher at last night's banquet.

Four other chemistry teachers were honored by the Armed Forces Chemical Association. They are Henry C. Martin, Palo Alto Senior High School; Cecil Carroll, George Washington High School, San Francisco; Raymond J. Palmer, Tamalpais High School, Marin county, and Sister Mary Noel, Mercy High School, San Francisco.

Collegian - Fresno St. Coll. 2/17/56

Dr. Glenn T. Seaborg Will Address Pacific Meeting Of Chemistry Profs

Dr. Glenn T. Seaborg, a 1951 Nobel Prize winner, will speak at a joint section meeting of the Fresno Pacific South West Association of Chemistry Teachers at 8 o'clock tonight on the Fresno State College Shaw Avenue Campus.

Dr. E. B. Womack, FSC Chemistry Department head, said that Seaborg, a University of California graduate, will discuss Transuranium Elements and Nuclear Energy.

Seaborg, who is associate director of the Radiation Laboratory at UC at Berkeley, is presently working on the transuranium elements and the identification of the various high-energy nuclear re-

actions caused by the operation of the accelerators at UC at Berkeley.

Seaborg directs the work of a group of graduate students in the field of nuclear chemistry at UC at Berkeley. He also teaches undergraduate courses in this field.

Besides Seaborg, Womack said, a number of other important speakers will be heard during the Saturday session of the two-day meeting. They include Dr. Bentley Edwards of UC; Richard H. Eastman of Stanford University, and Norman Lofgren from Chico State College.

A film, "See It Now," concerning Dr. Oppenheimer on the Institute for Advanced Study at Princeton will also be shown.



Winner Explains His Exhibit S.F. News 2/22/56

Carl A. Kuhn Jr., UC freshman science student, shows his 1955 prize-winning project in the Science Fair to Glenn T. Seaborg (left), UC nuclear scientist, and

R. G. Follis, chairman of the fair's advisory board, at luncheon yesterday announcing plans for the 1956 fair. Kuhn's exhibit demonstrates "electroplating with paste."

Director Outlines Science Fair Aims

Hope to Step Up Technical Training For Youth Prime Objective of Event

The annual Science Fair sponsored by business and educational leaders is one of the best means of attracting young people into the scientific field, R. G. Follis, chairman of the Bay Area Science Fair Advisory Board, said yesterday. Follis, board chairman of Standard Oil Co. of California, cited the declining interest of American youth in a scientific career as he outlined plans for the 1956 fair at a luncheon at the St. Francis Hotel.

Dependent on Science

He said, "Never before has society so depended on technical knowledge and this dependence is increasing."

He pointed to the disparity between the number of scientists being graduated each year by Russia and by the U. S.

"Last year the number of graduating engineers in the U. S. dropped to a low of 20,000," he said, "while Russia produced 54,000."

This is one of the reasons, he

said, why the Science Fair is growing in importance.

Active Interest

Objectives of the fair are to stimulate students to take a more active interest in a scientific career and to encourage educators to guide scientifically minded students toward this goal, Follis declared.

Robert Rice, head of the Berkeley High School science department, and member of the fair's planning board, sketched details for the 1956 fair, April 7-11 at the California Academy of Sciences.

This year, he said, regional competition will be held in 12 Bay Area counties with winners competing in the finals here. Last year's winners were guests at yesterday's lunch.

Science Fair Puts Accent On Technicians' Key Role

By RALPH CRAIB

The future of the Nation may well be influenced by such events as the Third Annual Bay Area Science Fair.

Not only defense rests on training youths for technical careers — but the Nation's standard of living as well.

These observations came from Dr. Glenn T. Seaborg, Nobel Prize University of California chemist, as some 65 educators, scientists and business executives met in San Francisco yesterday for a progress report

on the teen-aged fair, to be held April 7 to 11.

R. G. Follis, chairman of the board of Standard Oil Co. of Calif. and chairman of the fair's advisory board, underlined Seaborg's belief as he called attention to "the demand for technicians of all kinds in science, engineering, chemistry and other fields" which grows "by leaps and bounds."

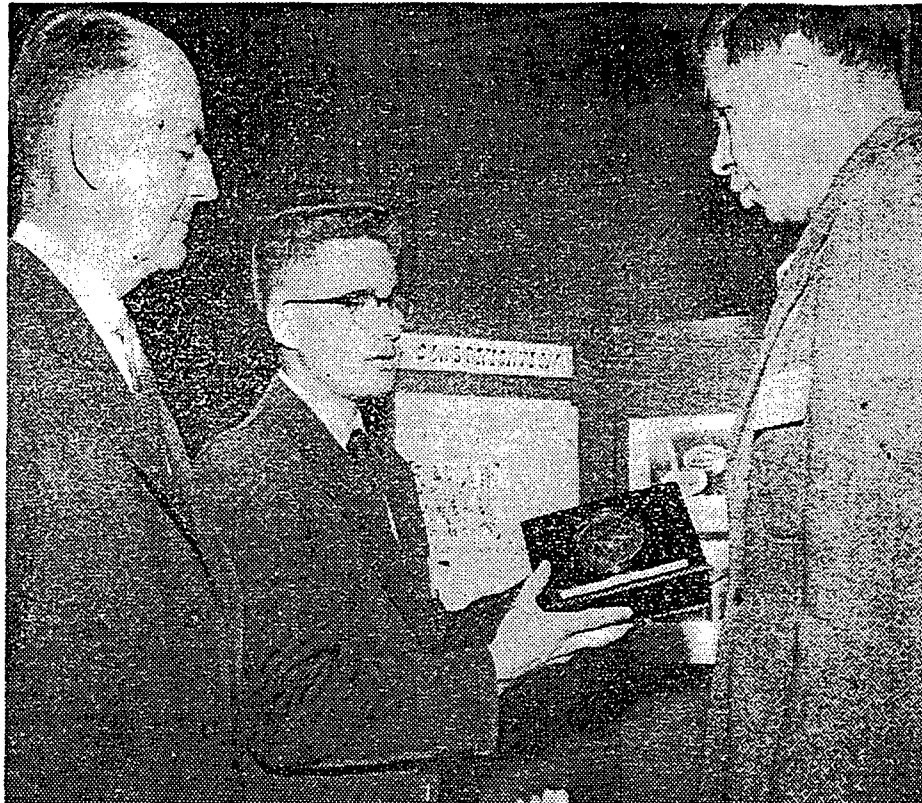
SCIENTIFIC NEEDS

"Today, we live in a society which has as its foundations a complex body of scientific knowledge," Follis said. "Our increasing standard of living and our national defense depend directly on continued advancement of our scientific frontiers."

"As the warm atmosphere of the Geneva conference has faded into the more familiar bitter feelings of the cold war, we can not but realize more strongly the necessity for maintaining our technological strength," the executive declared. "Last year in the United States, the number of graduating engineers dropped to a low of about 20,000. A similar curve for the Soviet Union would show a sharp rise for the last several years."

"For example, in 1950, 28,000 engineers were graduated in Russia; 40,000 in 1953, and 54,000 in 1954. It is estimated that they are now producing engineers at a rate of about two and one-half to our one."

"We were all taken aback to read that the Russians surpassed us in guided missile development," he said. "But it is not only in the defense field that we must worry. Maintaining the progress of our society depends on science."



SCIENCE FAIR—Gary Acker, 16, of Berkeley, shows the exhibit which won him a grand prize at last year's Bay Area Science Fair to Glenn T. Seaborg (right), University of California chemist, and R. G. Follis, chairman of the Fair's advisory board.

SPARKS ECONOMY

Doctor Seaborg, who won the highest award of the scientific world as codiscoverer of plutonium with Dr. Edwin McMillan, noted that the entire U.S. economy "is geared to technical advance."

Russia is training scientists, he said, "both in quantity and quality." At last year's Geneva Atoms for Peace international meeting, the professor said, he talked to Soviet scientists and was impressed with the vast technical training program they described.

The USSR, he reported, is subsidizing 250,000 science students annually and is requiring that one-third of elementary school education be given to mathematics and science curriculum.

This Nation, he said, is "losing its prospective scientists between high school and college because we are not inspiring young people to enter engineering and scientific training."

While he acknowledges that the U.S. can not arbitrarily order students into engineering fields as the Soviet has done, he said we must offer encouragement and inducements to obtain the same result voluntarily.

TEACHER SHORTAGE

Seaborg attributes some of the blame for U.S. shortage of trained engineers and scientists to a shortage of adequately trained high school science teachers. Persons with suitable training, he said, are easily induced to enter private industry for better pay.

Robert Rice Named Top Bay Chemistry Teacher

Robert Rice, Berkeley High School teacher and a founder of the teen-age Bay Area Science Fair, is this region's "Outstanding Chemistry teacher."

He won that designation, a \$100 check and a chance to compete for national honors and a \$1,000 prize last night at a dinner of the San Francisco Chapter of the Armed Forces Chemical Association.

Rice, a teacher for 21 of his 44 years, heard one of the nation's outstanding scientists, Uni-

tor for the 11 Western States of the NSTA.

Rice was selected from among five Bay Area teachers nominated for the local honor. The Armed Forces Chemical Association, which presented the award at a dinner at the Presidio Officers' Mess, sponsored the award because of its concern over shortage of qualified engineers and this handicap on national defense.

In the principal address at the banquet, Dr. Seaborg said that "the neglect of the scientific disciplines in the pre-college school system presents one of the big paradoxes of our present-day American society.

MODERN MARVELS

"On the one hand, we have the general realization of the great importance of science in our daily lives," he said, noting that television, synthetic clothing, detergents, plastics, synthetic rubber tires, penicillin, sulfa drugs, wonder metals, jet airplanes and atomic power were all contributions of scientifically-trained researchers.

"On the other hand," he continued, "it has become increasingly apparent that the school system is largely failing to fulfill the functions which are clearly assignable to it on any straightforward consideration of the importance of science and engineering to our national and individual health, well-being, prosperity and security."

The shortage of science teachers, he said, is "alarming" when contrasted with the stress on technical education of the Soviet Union.

SERIOUS SHORTAGE

"We are training at present only half as many engineers each year as our country needs," the scientist said. "It is almost unbelievable that we are falling this far short of the mark, but unfortunately, it is true. At the same time, Russia is graduating over twice as many each year as we are."

Seaborg appealed for training of more engineers, added emphasis on training of science teachers who will encourage young students to enter technical fields and stress of mathematics and scientific subjects in elementary schools.



ROBERT RICE

Berkeley Teacher Honored

University of California Nobel Prize holder Glenn T. Seaborg, says that this profession is one of the most essential in the nation today.

The service and achievements of Rice in encouraging youngsters toward scientific or technical careers, Dr. Seaborg said, "provide a bright spot in the gloomy picture" of the nation's shortage of trained scientific personnel.

FAIR DIRECTOR

Rice, a graduate of the University of California in 1934 who lives at 1126 Colusa Ave., Berkeley, is executive director of the third annual Bay Area Science Fair, to be held at the California Academy of Science April 7 to 11. He is past president of the California State Science Teachers Association, California director for the National Science Teachers Association and direc-

The gathering, held at the Hotel St. Francis, heard Robert A.

Rice, head of the science department at Berkeley High School and executive director of the Science Fair, report that 140 schools are expected to participate in the event this year. Officials expect so many entries, he said, that they have already organized 18 smaller regional fairs in 12 Bay Area counties as elimination judging events.

A feature of the fair, Rice said, will be an evening preview attended by the youthful exhibitors and engineering and educational leaders to discuss the displays and their meanings.

Sixteen-year-old Gary Ackers, of 2240 Prince St., Berkeley, a Science Fair grand prize winner last year, was among honored guests at the luncheon. An "A" student and member of the Berkeley High School track team, young Ackers chatted with the Noble Prize scientist about their mutual interests.

BACTERIA RESEARCH

Gary isolated, identified and grew heat-loving bacteria from water he took from a Calistoga area hot spring. His paper established "an experimental determination of the relationship between the growth rate and growth temperature an *Bacillus thermoamylolyticus*." His work was at college level, his instructors said.

Oakland Area participants in the meeting included:

Dr. John Buchanan, Vallejo City Schools director of secondary education; James W. Dent, Mt. Diablo Unified School District superintendent; Henry Spies, Antioch-Live Oak School District superintendent; L. W. Reinecke, Alameda County Schools general supervisor; William Weichert, Oakland Public Schools supervisor of science; Paul C. Bryan, Albany Public Schools superintendent; Theodore L. Bystrom, Piedmont Public Schools superintendent; Franklin Fisher, president of Golden Gate Academy, Oakland; Edgar B. Jessup, president of Marchant Calculators, Inc., Emeryville, and Dr. Joel Hildebrand, emeritus professor of chemistry at the University of California.

S.F. Examiner CCCC★ Thursday, Mar. 29, 1956

Seaborg Asks Science Teaching in 1st Grade

Dr. Glenn T. Seaborg, Nobel prize winning University of California chemist, urged last night that the teaching of science begin as early as the first grade in order to overcome the country's lack of trained scientific personnel.

Doctor Seaborg spoke at a dinner of the Armed Forces Chemical Association, San Francisco chapter, at the Presidio. The group named Robert Rice, chairman of the Berkeley High School science department the Bay area's outstanding chemistry teacher.

Doctor Seaborg, calling Rice's record a "bright spot" in an otherwise gloomy picture, said that high schools in general are failing to offer adequate scientific education.

INITIAL INSPIRATION.

His plan for introducing first grade students to science would be part of the "initial inspiration" which can assure many young persons a start in science.

Such inspiration, lacking in great part today, could give the country many hundreds of scientific geniuses and thousands of successful engineers and scientists whose service would be lost otherwise.

As he has previously, Dr. Seaborg warned of a serious shortage of high school science teachers. Last year, he said, 6,000 new teachers were needed, but only 4,000 graduated from college, and of these only 2,000 took high school science teaching posts.

And of the 2,000 only 200

were trained to teach physics, he said.

He contrasted the "appalling" state of science teaching in this country, where about half the high schools do not have physics courses, with that in Russia where high school students receive six years of training in biology, five years in physics, four years in chemistry and the entire mathematics curriculum from algebra through trigonometry.

Only one student in five studies physics in American high schools, he said, and less than a third have instruction in chemistry.

COLLEGE WORK.

In addition to extending science teaching down through the lower grammar school grades, Doctor Seaborg suggested that colleges could work to provide "a substantial fraction of our literate citizens with understanding of the basic principles of the mathematical, physical and biological sciences."

Rice, who received the association's award at the dinner, also was given a \$100 check and a chance to compete for the association's \$1,000 prize as the Nation's top science instructor.

Other teachers honored were Henry C. Martin, Palo Alto High School; Cecil Carroll, George Washington High School; Raymond J. Palmer, Tamalpais High School, Mill Valley, and Sister Mary Noel, of Mercy High School, San Francisco.

Unused U. S. Science Talent Cited at U. C. 4/3/56

BERKELEY.—America has a wealth of scientific talent that will never be used—although this country faces a severe shortage of scientists.

This was the assertion of Dr. Glenn T. Seaborg, University of California Nobel Laureate and co-discoverer of plutonium, in a recent talk in which he presented an award for outstanding high school teaching.

“Among the young people of our country today there are many thousands, perhaps tens or hundreds of thousands, who could become very successful scientists and engineers, who will never do so because they fail to receive the initial inspiration to consider seriously trying their hands in this field,” Dr. Seaborg said.

“Among these groups are certainly many hundreds of potential scientific geniuses whose latent talents will never be put to use.”

The scientist said that in view of the very great importance of science in our daily lives, “the neglect of scientific disciplines in the pre-college school system presents one of the big paradoxes of our present-day American society.”

Dr. Seaborg stated that the high school system is failing to fulfill its functions in preparing young people for science careers, and that the colleges and universities should considerably increase their teaching of science.

Schools Neglect Basic Subjects

S.F. Chronicle

4/8/56

WILLIAM BENTON, former U. S. Senator from Connecticut, recently made a purposeful visit to Soviet Russia to gather information for the Encyclopaedia Britannica; he set down some of his findings for the New York Times Magazine in an article aptly titled: "Now the 'Cold War' of the Classrooms."

It is now his conviction, he reported, "that Russia's classrooms and libraries, her laboratories and teaching methods, may threaten us more than her hydrogen bombs or guided missiles . . ."

In explanation of that conviction, he added his voice to the growing and mournful chorus of government leaders, educators, industrialists, and others who have been complaining that Russia has overtaken and is fast outdistancing the United States in the production of scientists, engineers and technicians.

Wanted: 75,000 Engineers

The statistics are indeed impressive and alarming. While the United States was graduating 23,000 engineers in 1954, Soviet Russia was graduating 53,000—and raised the figure to 63,000 last year. The United States is educating about half as many engineers as the country needs; there is now a shortage of 75,000. The severity of the shortage may be judged by the fierce competition for their services now being waged by industry through ads in technical magazines and daily newspapers, and by direct recruiting on college campuses.

It is the testimony of Allen Dulles, director of the Central Intelligence Agency: "Between 1950 and 1960, Soviet Russia will have graduated 1,200,000 scientists and engineers, compared with 900,000 in the United States in our present program."

Schools and Automation

In all such cries of alarm, there is criticism, direct or implied, of the American educational system and a broad suggestion that it has failed to adjust to the demands of this scientific, technological era of synthetics, electronics and automation.

In a recent address before the Armed Forces Chemical Association in San Francisco, Glenn T. Seaborg, Nobel prize-winning nuclear chemist, professor of chemistry at the University of California, touched upon such matters and specifically noted some deficiencies in the present system. It has failed to produce enough qualified teachers of scientific subjects, he observed, and it is signally failing to produce enough scientists or engineers, or, for that matter, to provide even the crude understanding of the sciences that every man and woman ought to possess today.

Half of the schools in the United States teach no physics at all, according to Professor Seaborg, and only one student in five learns any physics at all before leaving high school. Fewer than one third take any chemistry. The explanation is to be found in the fact that whereas physics was one of ten subjects offered to high

school students in 1890, it is now one in 300—and the other 299 are likely to be easier, less bothersome, or more attractively presented.

By way of contrast, Senator Benton reports as follows on the Russian school system of today: "Russian youngsters go to school six days a week and more hours per day and more weeks per year than ours do. Discipline is strict, study hours are long, the curriculum is demanding and examinations are severe. At all levels, Soviet students like European students in general, work much harder than do our American youngsters.

Science, Math Compulsory

"Soviet children for the first four years of the ten-year school concentrate on reading, writing, arithmetic and Russian. In the last six years more than 40 per cent of their time goes to science and mathematics. During these years they must take algebra, geometry and trigonometry. Also compulsory are four or five years of physics, four years of chemistry, two years of biology, a year of astronomy and a year of psychology. Finally, each student is supposed to take six years of a foreign language."

Professor Seaborg, while not advocating so rigorous a regimen for American students, observes that "it does lead to a widespread, thorough training in science and mathematics." He feels that mathematics ought to be introduced into the American curriculum early and so should science. How early is made plain in a statement already widely publicized:

Nobel Award^{4/18/50} Winner to Speak

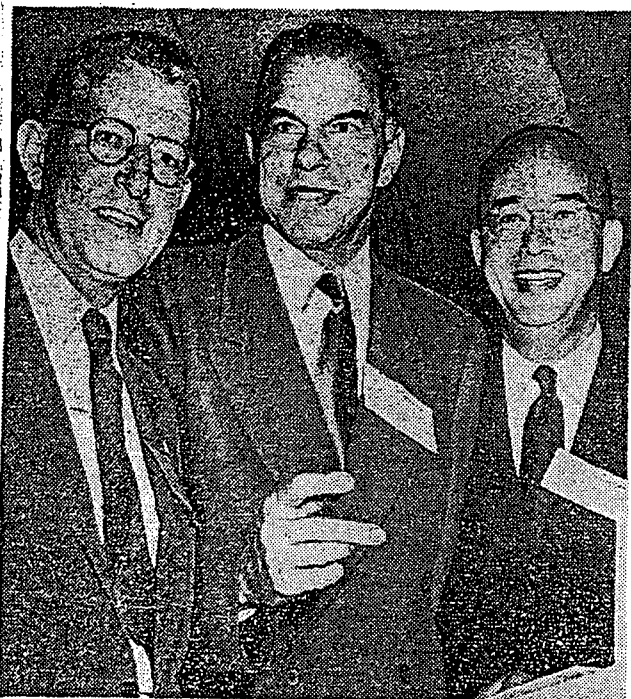
Approximately 200 alumni of the University of California at Berkeley are expected to greet university dignitaries at a dinner tonight at Maison Jaussaud and hear of latest developments at the campus of their alma mater. The event will begin at 7 p.m.

Among the speakers will be Dr. Glenn Seaborg, nuclear chemist and winner of the Nobel prize. Interested high school students have been invited to attend.

Dr. Seaborg will be honored at a cocktail party preceding the dinner, with members of the Kern County Alumni Club board of directors as guests. The affair is being given by Mr. and Mrs. Stuart Lewis at their Stockdale home. Dr. Seaborg is a brother of Mrs. Lewis.

Among others in the university party are Dr. Clark Kerr, chancellor; Paul Hastings; William W. Monahan, Berkeley campus business manager; Stanley E. McCaffrey, executive manager of the California Alumni Association, and Clifford Dochtermann, alumni field secretary and scholarship director.

Professor Blasts Lack of Science Education



THREE SPEAKERS at University of California Alumni Institute here yesterday were (from left) Dr. Arthur Turner, Riverside campus; Dr. Glenn T. Seaborg, Berkeley; and U. of C. Chancellor Clark Kerr.

—Los Angeles Examiner photo.

PASADENA, April 29.—The word "unsatisfactory" is wholly inadequate to describe the present deplorable state of affairs with regard to scientist training in this country.

This was the view expressed by Dr. Glenn T. Seaborg, professor of chemistry at the University of California at Berkeley, at one of four seminars attended by nearly 500 UC graduates at the annual Alumni Institute today at the Huntington-Sheraton Hotel.

"The neglect of scientific discipline on the pre-college level in face of the general realization of the importance of science in our daily life is one of the big paradoxes of American society," Dr. Seaborg declared.

"It has become increasingly apparent that the school system is failing largely to fulfill the functions which are clearly assignable to it."

Only about half as many scientists as are needed to meet present demands are being trained, he declared.

The two main problems appear to be failure to inspire high-school pupils and lack of science teachers. There will be a need for 10,000 more teachers in this field by 1965, he said.

HERE TO STAY —

Describing what the university is doing to overcome the problem, he told of an experimental program in which science majors may go into the teaching field without having to take "countless courses in education" which, he claimed, has driven many good scientists away from teaching.

In another seminar, Dr. Eugene Grabbe, university extension instructor, discussed automation which he described as the new systems of production and data processing.

He said automation is here to stay. It can't be stopped, but it must be controlled, he said. The speed with which it takes over must be kept in check because of the technical problems and labor displacement created by it, he said.

Automation has had and will continue to have a tremendous impact on the nation, the principal outcome being shorter hours for the working man plus a higher standard of living, he added.

Dr. Donald S. Howard of UCLA spoke on "Problems and Needs of California Youth Today."

The problems facing youth mainly are that adults unintentionally forget and even deny the fact that young people are the state's most valuable and most sound resources, he said. Furthermore, they face conflicting demands of their parents who want their children to develop initiative and independence but who often thwart this growth by falling to encourage it, he said.

Youth resents being judged as "all bad" on the basis of publicity about the small percentage that gets into trouble, he added.

Nor is the juvenile delinquency problem as bad as it might appear, he said. When the over-all picture is considered, only 1823 persons under 18 years of age were committed to the California Youth Authority in 1955, he said. This is out of a population in this age bracket of 3,910,000, he said.

What is going to be necessary to solve youth's problems in the future, when the under-18 bracket is going to compose 35 per cent of the total state population, is to find some way to meet the "Three E's" needs of young people—education, employment and "ennurturing," he said. He defined the latter term as being the right combination of love and discipline.

Dr. Arthur Turner, political scientist at the Riverside campus, declared at his seminar that America's foreign policy lacks flexibility with which to meet the new phase of the threat of communism.

Since this threat is no longer military in nature, military organizations like NATO and SEATO not only are irrelevant but even contribute to the Soviet propaganda line of picturing America as military-minded and Russia as peaceable, he declared.

"the word 'unsatisfactory' is wholly inadequate to describe the present deplorable state of affairs."

Potential Scientists Lost

Dr. Seaborg explained that studies have shown a serious loss of potential scientists occurs in the step from high school to college.

"We simply must do something about teaching sound science to more high school students," he said, "and we must find means to inspire more such students to choose science or engineering as careers . . . The main problem is one of inspiring high school students."

Another speaker, Dr. Arthur C. Turner, chairman of the Division of Social Sciences at UC's Riverside campus, discussed "New Phases of International Politics," in which he called for "new ideas" in this nation's foreign policy.

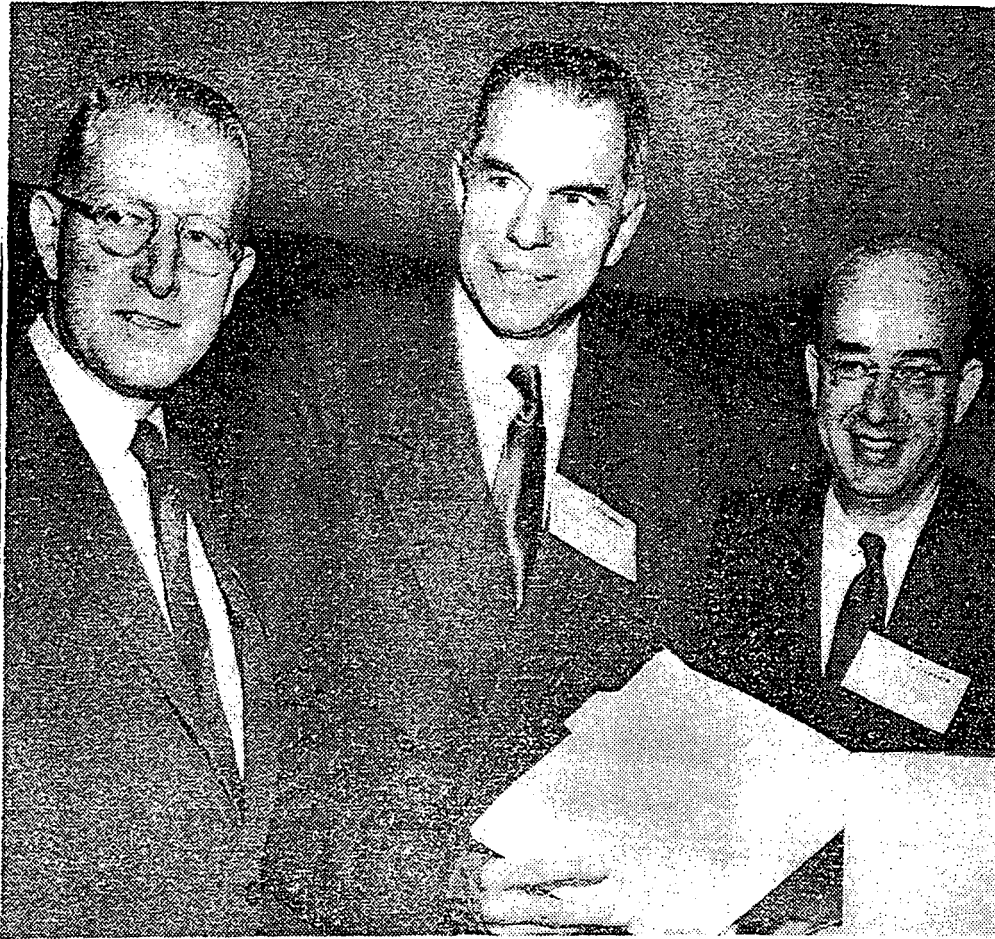
" . . . These new ideas will only be arrived at," he said, "if we make a serious reappraisal of the situation and try to devise policies to meet what is going on in the world today and not what was going on, or appeared to be threatened, six or seven years ago."

Easiest Line

"In all government departments and especially, perhaps, in a Democracy, much the easiest line of policy to pursue is a continuation of what you are doing already. The administrative channels have been set up; political consent has been secured. By comparison, anything new is always more difficult. Yet, what is required here may well be something new."

Dr. Clark Kerr, Chancellor at Berkeley, spoke of the tremendous increase in the number of students attending the nation's universities. He told the luncheon guests there are presently 2,700,000 college students in the United States, a figure that will increase to an estimated 6,400,000 in 1970.

"In California, between 1950 and 1960, the number of high school seniors graduating will double," he said. "Today, 39% of them go on to junior college or a university, compared to only 4% in 1900."



INSTITUTE SPEAKERS—From left, Dr. Arthur C. Turner, Dr. Glenn T. Seaborg and Dr. Clark Kerr were among speakers at UC's Alumni Institute in Pasadena. *Times photo*

SEABORG FLAYS SYSTEM *L.A. Times 4/30/56*

High Schools Neglect Teaching of Science, UC Professor Charges

A Nobel Prize-winning nuclear chemist yesterday sharply criticized the nation's high school systems for what he described as their neglect in teaching science and engineering to young students.

At the same time, Dr. Glenn T. Seaborg, professor of chemistry at the University of California at Berkeley, said some means must be found to interest more high school youths in choosing these fields as careers.

Dr. Seaborg was one of five UC professors and administrators who addressed the University's Alumni Institute

during an all-day session at the Huntington-Sheraton in Pasadena. A luncheon attended by 300 alumni highlighted the meeting.

The nuclear chemist pointed to the paradox that exists in America today because of the neglect of "scientific disciplines in the precollege school system," despite the recognized importance of scientists and science.

System Largely Failing

"On the one hand, we have the general realization of the great importance of science in our daily lives," he said. "On the other hand it has become

increasingly apparent that the school system is largely failing to fulfill the functions which are clearly assignable to it on any straightforward consideration of the importance of science and engineering to our national and individual health, well-being, prosperity and security."

Even colleges and universities, he said, could improve their teaching of science and increase the number of qualified graduates in this field.

"In our high school system, speaking of the overall national picture," he added,

West Faces Shortage of Scientists

The western world faces a serious shortage of scientists and engineers, according to Dr. Glenn Seaborg, co-discoverer of plutonium, the raw material of the atomic bomb.

The shortage, in both Canada and the United States, could have a serious effect on both defence research and the development of technology, he said.

Dr. Seaborg is attending a meeting of the Pacific Coast Conference, an athletic grouping of nine U.S. west coast universities, in the Empress hotel.

Dr. Edwin McMillan and Dr. Seaborg, as discoverers of plutonium, shared \$32,000 when they were awarded a Nobel Prize in 1951 for their work in "trans-uranium elements."

Russia, Dr. Seaborg noted, is producing scientists and engineers at a great rate.

The United States, he said, is facing a shortage of high school and university teachers in science.

This could become a vicious circle, as a shortage of teachers means fewer science graduates and a growing shortage.

The law of supply and demand has raised the price of some good graduate doctors in physics to \$1,000 a year, the first year after leaving school, he said.

Russia Overhauling

Canada, U.S.

More high school students must be interested in making science a career.

Dr. Seaborg is continuing his work in nuclear chemistry at the University of California, and expects to create still more elements.

Heaviest element created so far is mendelevium, with an atomic number of 101. Dr. Seaborg hopes to create 102, 103 and so on.

Plutonium is number 94 and, like other elements higher in number, is synthetic.

Break-through Story

S.F. Chronicle

8/13/56

Budding Chemist Gave U. S. Lead on A-Bomb

By Nate Hale

A BUDDING chemist with only an A.B. degree, practical experience and sensitive intuitions upset the expectations of his colleagues and gave the United States a year or so lead in making the first atom bomb.

This major break-through, finally declassified by the Atomic Energy Commission, was discussed modestly last week by its originator, Dr. Stanley G. Thompson, chemist at the Radiation Laboratory of the University of California.

What Dr. Thompson did was to find a chemical way of extracting the fissionable material, plutonium, easily and in quantity from uranium and from fission stuffs produced by an atomic pile. Plutonium is the fuel that powers the atomic bomb.

At the time, of course, Dr. Thompson's way was considered quite impossible by the chemical world.

He believes his industrial experience with Standard Oil at its Richmond plant helped him more toward his discovery than a doctor's degree would have.

"At Standard I learned, for example, that you don't make big equipment out of glass," he said.

At the time plutonium was produced in infinitely small quantities by several laborious methods: by transmuting uranium, by bombarding uranium rods with neutrons which produced a mass of highly radioactive fission products, of which plutonium was only a small part.

So scientists hoped for a process to separate easily the plutonium from the "junk."

They had to devise a special chemical compound to

put into a solution containing the dissolved uranium rods. The compound would have to combine with the plutonium but not be soluble itself.

Dr. Thompson, who made his critical experiments on the Manhattan Project in Chicago, used his intuitions and came up with a possible special compound — bismuth phosphate.

It worked like a charm, drawing out 98 per cent of the plutonium in a given sample of bombarded uranium rods.

The scientific world — or that part of it which knew of the experiment — was sceptical and unbelieving. But repeated tests bore out Dr. Thompson's hunch, and other scientists confirmed it.

In fact, the Thompson process was used at Oak Ridge, Tenn., and then on an industrial scale at the great Hanford atomic works in Washington State.

It has since been superseded by less expensive methods; and Dr. Thompson has gone on to help discover five new elements, 97 through 101, at the university.

A paper on the plutonium process was written by Dr. Thompson and Dr. Glenn T. Seaborg, Nobel Laureate and head of the chemistry group at the university's Radiation Laboratory for the Geneva Conference, last year, but because of classification problems it was not presented then.

The story of the break-through was released by the University of California last week and has been published by the Pergamon Press, London, in a new book, "Progress in Nuclear Energy, Series III, Process Chemistry."

Oakland Tribune 9/24/53

U.S. Trails in Atom Training

BERKELEY, Sept. 24—Russia is far ahead of the United States and other Western powers in a vital part of the nuclear race — the training of future scientists — Nobel prize winner Dr. Glenn T. Seaborg told editors and publishers of Northern California's weekly newspapers at the University of California last night.

He asked their help in focusing attention on what he called "a serious shortage" of American scientists and engineers and a fundamental weakness in American education in these fields.

STUDENTS CHOSEN

"In Russia, 250,000 subsidized high school graduates, chosen on a basis of their potential scientific abilities, enter college-level training each year," the famed U.C. chemist and co-discoverer of plutonium told the newsmen. "In the United States, if we started today to build up the scientific manpower this country needs, it would take us a generation."

"The higher pay of industry has drained away from the high schools large numbers of competent teachers and college graduates who would have become able science teachers," he said. "Only 4½ per cent of our high school students are enrolled in physics courses, only 25 per cent take algebra, and only 15 per cent study high school geometry."

SERIOUS SHORTAGE

"We already have a very serious shortage of scientists and engineers and the rate we are producing them is far short of our requirements from the standpoint of the national economy in peacetime," he added. "The problem obviously would be far more acute during a period of mobilization."

The publishers, some 100 strong, continued their workshop sessions at the University campus this morning, were welcomed by President Robert Gordon Sproul and Chancellor Clark Kerr before adjourning, and were guests of the university at the California-Illinois football game.

THE RESEARCH FRONTIER *Sat. Review* 8/4/56

By Dr. Glenn T. Seaborg, a Gordon Frontiersman, Department of Chemistry and Radiation Laboratory, University of California, Berkeley. High temperature thermodynamics is certainly one specific area where increased activity in basic research might be required. Heat transfer is also in this category. In my opinion a limit to the extent to which atomic power can be used in the future will be set by the ultimate solution to the atomic waste disposal problem. And here, it seems to me, the path for the ideal solution must lie outside of any ideas presently contemplated.



—Acme.

U.C. Scientists Team Seeks To Rebuild Rare Elements

BERKELEY, Oct. 24 — Reconstruction of a group of chemical elements that existed in nature during only a few, fleeting seconds as the earth was being formed will soon be tried by a team of University of California scientists.

Dr. Glenn T. Seaborg, Nobel Laureate and professor of chemistry, described the chemical characteristics of the elements—all of which will have an atomic weight above 101—during the annual Gilbert N. Lewis memorial lecture were, last night.

Dr. Seaborg said experiments with the new "Heavy Ion Linear Accelerator," known as the Hilac, will lay the ground work for advancing the periodic table of chemical elements up to possibly 108. The heaviest chemical element so far actually measured and observed by scientists is mendelevium, Element 101, discovered last April by Dr. Seaborg and associates.

UNDER CONSTRUCTION

The atom-smashing Hilac, now being built at the U.C. Radiation Laboratory, is expected to be in operation by late November.

Dr. Seaborg, co-discoverer of all chemical elements from plutonium, Element 94, through mendelevium, explained that all elements heavier than uranium, Element 92, do not now exist in nature.

While these elements were created naturally during the various early stages of the earth's evolution, when temperatures and pressures were violent and different than now, they have since decayed and turned into lighter materials due to their high radioactivity, it was said.

The first of the transuranium elements to be reconstructed by man was neptunium, Element 93, discovered in 1940 at U.C.

by Dr. E. M. McMillan and Dr. P. H. Abelson. For their research with the 60-inch cyclotron in producing the long-extinct element, the pair won the Nobel Prize.

Since the 1940 discovery, new elements have been discovered almost annually, Dr. Seaborg related.

The U.C. scientist explained that the chief method used in reconstructing elements heavier than uranium is to fire atomic particles, such as the nuclei of helium atoms known as alpha particles, into heavy elements.

TECHNIQUE TOLD

An illustration of this technique—known as transmutation—was described when Dr. Seaborg related how he and his colleagues fired the nuclei of nitrogen atoms into a target of uranium with the university's 60-inch cyclotron.

Among the debris from this high-energy electronic bombardment, the scientists recovered

atoms of Element 101, with a half life of from half an hour to several hours.

Dr. Seaborg explained that the new Hilac will enable Radiation Laboratory scientists to accelerate much heavier particles than is possible with existing equipment.

He predicted that within five to 10 years U.C. scientists will have "discovered isotopes of chemical elements with atomic weight up through 105.

Dr. Seaborg said it is possible to predict the chemical and physical properties of elements up through 119. However, with present day techniques it is doubtful if an actual identification can be made of elements beyond 108.

Berkeley Daily Gazette
10/25/56

UC Seeks For 'Lost' Elements

Upon a few tricks of nuclear transmutation and a new type of atom-smasher scientists pin their hopes of making some new forms of matter that probably became extinct a few minutes or even seconds after the birth of the earth.

A description of what the extinct elements heavier than element 101 will be like and how a group of University of California nuclear chemists hope to fabricate them in the laboratory has been disclosed today by Dr. Glenn T. Seaborg, Nobel Laureate and professor of chemistry on the Berkeley campus.

Dr. Seaborg, a co-discoverer of all the elements beginning with plutonium, element 94, and extending up to and including mendelevium, element 101, last night

delivered the annual Gilbert N. Lewis Memorial Lecture. Dr. Lewis was the revered late dean of the College of Chemistry at Berkeley, and Dr. Seaborg described in detail for the first time some of the predicted radiation and chemical properties of undiscovered elements up to and including 105, as well as how he and his colleagues hope to make them.

Essentially all of the elements heavier than uranium, element 92, are non-existent in nature. All such elements may have existed at the birth of the earth, Dr. Seaborg pointed out, but they were all highly radioactive; as a consequence, they decayed, turning into lighter elements and became extinct.

In 1940 Dr. E. M. McMillan and Dr. P. H. Abelson, using the Berkeley 60-inch cyclotron, created element 93. This was followed a year later by plutonium, the nuclear energy fuel, discovered by Dr. Seaborg and his colleagues. Over the years most of the other elements were created in the same cyclotron, climaxing in 1955 with the discovery of element 101. Elements 99 and 100 were first detected in the debris of the first hydrogen bomb explosion in the Pacific.

BOOTSTRAP OPERATION

The discovery of the new elements has been a bootstrap operation, Dr. Seaborg pointed out. The stable building material for all of them is uranium, element 92. As heavier and heavier elements are made, the elements are more and more radioactive; so they decay more and more quickly. Moreover, fewer and fewer atoms of the heavy elements can be made. For example, in the case of element 101, only 17 atoms were detected in the discovery experiments — a quantity of matter much too small to see.

The scientist said he hopes it will be possible eventually to make isotopes of elements up through 105 that can be identified by means of both their chemical and radioactivity properties. This may take as long as five to 10 years.

It will be necessary to rely upon unusual isotopes. Most of the isotopes of even element 102 will be too short lived — as short as a second — to identify. But there are some unusual isotopes with an odd number of neutrons that will have half-lives as long as minutes, and it is upon the creation of these that the scientists will pin their hopes.



DR. GLENN SEABORG

Professor Who Won Nobel Prize Will Speak Here

Dr. Glenn Seaborg, Nobel prize winner in chemistry and a member of the University of California faculty will be a guest Monday at a UC alumni luncheon at Pierpont Inn, Ventura.

He will speak on the topic, "Scientists of Tomorrow."

Dr. Seaborg was co-winner of the Nobel prize in chemistry in 1951. He is also Cal's faculty athletic representative to the Pacific Coast conference.

Brooke Sawyer, Santa Paula, president of the county alumni organization, is chairman of the luncheon which starts at 12:15.

Others who will be on hand to speak briefly include Paul (Bud) Hastings, newly-appointed executive director of Associated Students; William E. Monahan, Berkeley campus business manager; Stanley E. McCaffrey, executive manager of the California alumni association and Cliff Dochterman, alumni scholarship director.

An informal reception will follow the luncheon.

The meeting is open to the general public as well as alumni. Reservations may be made with Carl Phleger, MI 3-6723. Cost is \$2 per person.

Berkeley Gazette 12/4/56

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A description of what the extinct elements heavier than element 101 will be like and how a group of University of California nuclear chemists hope to fabricate them in the laboratory has been disclosed today by Dr. Glenn T. Seaborg, Nobel Laureate and professor of chemistry on the Berkeley campus.

Dr. Seaborg, a co-discoverer of all the elements beginning with plutonium, element 94, and extending up to and including mendelevium, element 101, last night delivered the annual Gilbert N. Lewis Memorial Lecture. Dr. Lewis was the revered late dean of the College of Chemistry at Berkeley, and Dr. Seaborg described in detail for the first time some of the predicted radiation and chemical properties of undiscovered elements up to and including 105, as well as how he and his colleagues hope to make them.

Essentially all of the elements heavier than uranium, element 92, are non-existent in nature. All such elements may have existed at the birth of the earth, Dr. Seaborg pointed out, but they were all highly radioactive; as a consequence, they decayed, turning into lighter elements and became extinct.

In 1940 Dr. E. M. McMillan and Dr. P. H. Abelson, using the Berkeley 60-inch cyclotron, created element 93. This was followed a year later by plutonium, the nuclear energy fuel, discov-

ered by Dr. Seaborg and his colleagues. Over the years most of the other elements were created in the same cyclotron, climaxing in 1955 with the discovery of element 101. Elements 99 and 100 were first detected in the debris of the first hydrogen bomb explosion in the Pacific.

BOOTSTRAP OPERATION

The discovery of the new elements has been a bootstrap operation, Dr. Seaborg pointed out. The stable building material for all of them is uranium, element 92. As heavier and heavier elements are made, the elements are more and more radioactive, so they decay more and more quickly. Moreover, fewer and fewer atoms of the heavy elements can be made. For example, in the case of element 101, only 17 atoms were detected in the discovery experiments — a quantity of matter much too small to see.

The scientist said he hopes it will be possible eventually to make isotopes of elements up through 105 that can be identified by means of both their chemical and radioactivity properties. This may take as long as five to 10 years.

It will be necessary to rely upon unusual isotopes. Most of the isotopes of even element 102 will be too short lived — as short as a second — to identify. But there are some unusual isotopes with an odd number of neutrons that will have half-lives as long as minutes, and it is upon the creation of these that the scientists will pin their hopes.

Glenn Seaborg Honored Again—
Berkeley Daily Gazette 10/27/56

UC Scientist Wins Top US Chemistry Award

Glenn Theodore Seaborg, Nobel Laureate and director of chemical research, Radiation Laboratory, University of California, has been chosen to receive the 1957 Perkin Medal of the American Section, Society of Chemical Industry.

Announcement of the highest award in American industrial chemistry was made today by Raymond Stevens, chairman of the jury of award and president of the Cambridge, Mass., chemical consulting firm of Arthur D. Little, Inc.

Presentation of the medal to Professor Seaborg is scheduled to follow a dinner in his honor to be held at the Waldorf-Astoria, New York, on Jan. 11, 1957.

Co-winner, with Edwin M. Millan, of the Nobel Prize for Chemistry in 1951, Dr. Seaborg has received many coveted honors that can be bestowed on an American chemist and now adds to these outstanding recognition for the industrial chemical implications of his work in nuclear chemistry. Dr. Seaborg's important discoveries have added new chemical elements and new processes to the applied chemistry of nuclear energy and have greatly extended the broad new field of chemical knowledge of actinide elements discovered in connection with atomic energy studies.

In addition to the Nobel Prize and Perkin Medal, Dr. Seaborg

has received the Distinguished Service Award of the Chicago Junior Assn. of Commerce, 1945; Chemist of the Year Award of Chemical and Engineering News, 1946; Pure Chemistry Award of the American Chemical Society, 1947; William H. Nichols Medal, 1948; John Ericsson Gold Medal, 1948; Honorary Sc.D., University of Denver, 1951; Gustavus Adolphus College, 1954; and Northwestern University, 1954; and John Scott Award, 1953.

He was named Harrison Howe Lecturer, 1946; Nieuwland Lecturer, 1947, and one of "America's 10 outstanding young men," 1947, by the US Junior Chamber of Commerce.

Born in Ishpeming, Mich., April 19, 1912, Dr. Seaborg is a graduate of the University of California.

He participated in the discovery of nine chemical elements, Neptunium, Plutonium, Americium, Curium, Berkelium, Californium, Einsteinium, Fermium and Mendelevium, as well as radioactive isotopes of these and other elements.

All of these elements lie in the so-called trans-uranium region and their very existence was hardly suspected before the work of Seaborg and others in connection with nuclear energy revealed them and proved their presence in the products of nuclear reactions.

ACTIVE IN AFFAIRS

Dr. Seaborg is active in the affairs of the American Chemical Society and is an honorary member of the American Institute of Chemists. He is also fellow of: American Physical Society, American Philosophical Society, Royal Society of Arts, Royal Swedish Academy of Engineering Sciences. He is a member of National Research Council, International Council of Scientific Unions, National Academy of Sciences, American Scandinavian Foundation, American Assn. for the Ad-

vancement of Science, Sigma Xi, Pi Mu Epsilon, Alpha Chi Sigma, Phi Lambda Upsilon.

He was married in 1942 to Helen Lucille Griggs and is father of four sons and a daughter.

The 1957 award will be fifty-first impression of the Perkin Medal, bestowed annually for outstanding achievement in applied chemistry in the United States.

ESTABLISHED IN 1906

Established in 1906, the medal honors Sir William Henry Perkin and commemorates his discovery of the first synthetic dye in 1856. Perkin's work was the basis for the industry of synthetic dyes from which grew a large and vital part of today's organic chemical industry.

Cooperating with the officers of the American Section, Society of Chemical Industry, as members of the jury of award of the Perkin Medal are representatives of the American Chemical Society, the American Institute of Chemical Engineers, the Electrochemical Society, the American Section of the (French) Societe de Chimie Industrielle.

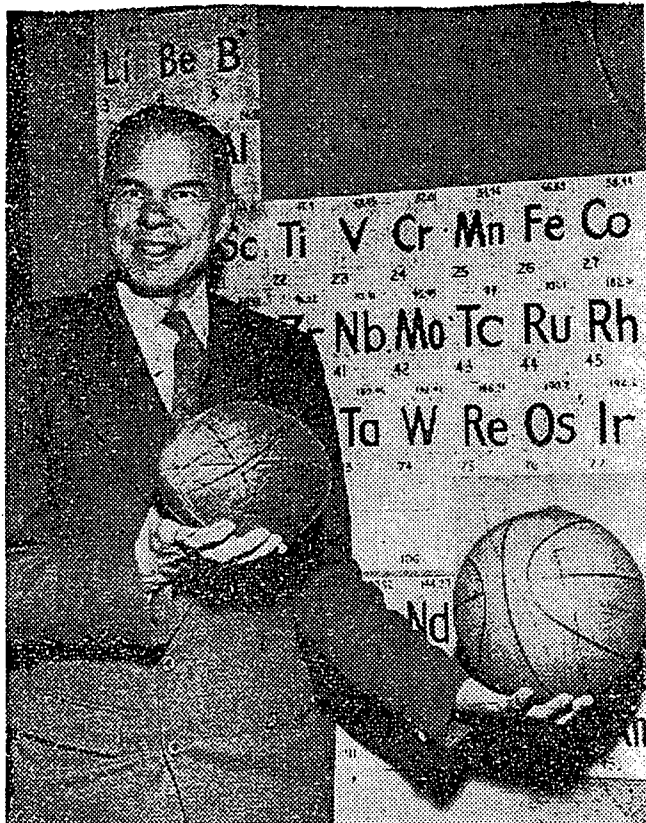
The Perkin Medal was first awarded to Sir William Henry Perkin in commemoration of the fiftieth anniversary of his synthesis of mauve, the first synthetic dye. Subsequently it has honored outstanding American industrial chemists including Irving Langmuir, for his development of the gas-filled incandescent electric light; Leo H. Baekeland, for the development of bakelite, first synthetic resin; Thomas Midgley Jr., for the development of non-detonating fuels for internal combustion engines; Robert R. Williams, for synthesis of vitamin B1 (thiamin); Charles M. Hall, for commercial production of aluminum; and other outstanding Americans for achievements in the field of applied chemistry that have helped raise our standard of living.

S.F. Exam: 10/28/56

HONORS SET FOR SEABORG

The University of California's Glenn T. Seaborg, Nobel Laureate, associate director of the radiation laboratory and codiscoverer of plutonium, will receive the 1957 Perkin Medal of the Society of Chemical Industry's American section.

The award, considered to be the highest attainable in the field, will be presented during a dinner banquet at the Waldorf Astoria Hotel, January 11, 1957.



DR. GLENN T. SEABORG
The football is a "uranium atom-nucleus"

Radio-TV Tidbits—Omnibus combines the talents of Pianist Leonard Bernstein and the India drummer, Chatur Lal, for an experiment, KABC (7), 9 p.m. . . . Larry Finley features the Statler's Gogi Grant, KTLA (5), 9:30 p.m. The L.A. Rams-Pittsburgh Steeler game is on KNXT (2) and KHJ-radio, 10:45 a.m. . . . Charles Laugh-ton sets the stage for Washington Square with some of his famed readings, KRCA (4), 4 p.m. . . . Columbia University's basketball team demonstrates the latest technique for Let's Take a Trip, KNXT (2), 9 a.m. . . . Dr. Glenn T. Seaborg, corecipient of the Nobel Prize for chemistry in 1951, shows off the University of California's mammoth Bevatron, on Journey Into Science, KNXT (2), 4 p.m. *L.A. Times*, 12/2/56

S.F. Chronicle
12/12/56
**KQED Series
To Explain
The Elements**

KQED, San Francisco's educational television station, has filmed and produced a science series on "The Elements," to be given nationwide distribution, the station's manager, James Day, announced yesterday.

The series will feature Dr. Glenn T. Seaborg, nuclear chemist who won the Nobel prize, and include many other noted scientists.

Aimed at presenting a clear and interesting picture of the complex story of the elements, much of the program was filmed "on location" at the University of California's radiation laboratory where many dramatic discoveries in the field have been made.

The ten-part series will be shown first over KQED, starting Friday, January 11 and continuing through March 15.

And in the next six months it will be shown over 25 television stations across the Nation.

The program was "motivated by the importance science has in the lives of all of us today," according to Day.

Seaborg, added he is "a great believer in television as a means of helping in the current crisis of shortage of teachers."

Illustrating the program's plain handling of complex problems, Seaborg hefted a basketball, "like the lead atom's nucleus," and a football, "uranium atom nucleus."

Joining Seaborg on the series are many other prominent scientists.

They include Dr. Edwin M. McMillan, Nobel prize-winning professor of physics; Dr. Ernest O. Lawrence, Nobel prize-winning inventor of the

cyclotron; Dr. Emilio Segre, who participated in the first discovery of a synthetic element, and Dr. Otto Struve, distinguished astronomy professor.

The series was produced by KQED in cooperation with the Educational Television and Radio Center, Ann Arbor, Mich.

It was conceived by Jonathan Rice, KQED's program manager, produced by E. G. Valens and written by Daniel M. Wilkes.

Elementary

Over cocktails, an eminent U.S. chemist expressed his concern about the dearth of young people interested in scientific careers. A television producer in search of programs overheard him. "If you feel that way," he said, "you should do something about it." So the chemist, Nobel Prize-winner Glenn T. Seaborg, co-discoverer of plutonium, and the TVman, Program Director Jonathan Rice of San Francisco's educational Station KQED, got together.

KQED to Launch Series On 'The Elements' Jan. 11

By JAMES ABBE *Oakland Tribune 12/12/56*

The first program in Dr. Glenn T. Seaborg's TV science series "The Elements" will be presented Jan. 11 over KQED.

The 10 half-hour programs, to be telecast by 24 other educational TV stations following the KQED debut, will present a cast of University of California scientists. Three of them are Nobel Prize winners. All are distinguished in their respective spheres.

In a press conference at the University of California Radiation Laboratory this week, Dr. Seaborg told us the purpose of the series.

"Everybody needs to know more about science," he said, "and we must steer our youth toward scientific careers to supply the scientific manpower of the future."

The Nobel winners who will do the TV steering are Dr. Seaborg, U.C. professor of chemistry and co-discoverer of the new chemical elements; Dr. Edwin M. McMillan, co-discoverer of the first heavier-than-uranium element; and Dr. Ernest O. Lawrence, inventor of the cyclotron.

Among other distinguished scientists who will appear in the series are Dr. Emilio Segrè, co-discoverer of the first synthetic element; Dr. Otto Struve, noted astronomer who will conduct us on a tour of the universe via astro-photos; and Dr. Melvin Calvin who will describe the complexities of an oil refinery.

The result of this collaboration, a series of ten half-hour television lessons called *The Elements*, will begin in January over the 22 educational TV stations in the U.S.

Chief scriptwriter and star of the show is tall, earnest Chemist Seaborg, who believes that "science should be a part of the repertory of a cultured man." The films were put together with a paltry \$44,000 budget by Rice and the staff of KQED, one of the most adventurous educational stations. In most of them Seaborg chats cannily about his favorite subject: nuclear science and the elements. "the building blocks of nature." His props include batches of the nine-odd man-made elements (plutonium, berkelium, etc.), batteries of blinking lights, clicking radiation counters, and black and white checkers to signify protons and neutrons. Seaborg uses them to demonstrate the manipulation of highly radioactive substance. In one film, for example, he extemporizes while a mechanical arm juts out from a wall, picks up a flashlight and directs a beam into a vat of boiling fluid. Another arm lifts a bottle of deadly radioactive fluid and pours a tiny but lethal amount into a test tube. A third mops the floor. Some of the shows deal with historic events in the young life of nuclear physics: in one, the University of California's Dr. Ernest O. Lawrence explains with magnets and diagrams how he invented the cyclotron.

"This series is the biggest thing we've ever attempted," says Rice, who has made some 85 educational shows (including a series with Atom Physicist Edward Teller). "It needed to be done, if only as a historical document." The document was crudely etched. Because both funds and the spare time of modern scientists were at a premium, there were few rehearsals and few retakes. Budgetary corners were



TV CHEMIST SEABORG & PROPS
Lessons for culture.

TERRENCE O'FLAHERTY



Up and Atom

A HANDFUL of Bay Area newsmen found themselves very close to the heart of the atomic age this week when KQED held a press conference in the "Cave Room" of the University of California's Radiation Lab. Seldom has the fourth estate been so radio-active.

The occasion was the announcement that our community-owned channel 9 will produce a TV series titled "The Elements" starring nuclear chemist Dr. Glenn T. Seaborg and an all-star cast of Nobel Prize winners and others including Dr. Edwin M. McMillan, Dr. Ernest O. Lawrence, Dr. Emilio Segre and Dr. Otto Struve.

Television viewers may not be as familiar with these names as they are with those of Jackie Gleason, Red Skelton, Liberace, and Sheena, Queen of the Jungle, but history books will make up for this. They are among the most distinguished men of our time.



ALTHOUGH the "Cave Room" may sound like a cocktail lounge in the vicinity of Carlsbad Caverns, it is actually the very heart of research in the field of nuclear chemistry at a university which leads the world in this activity.

The "Cave Room" is in a guarded section of the Berkeley Hills at the corner of a concrete building. It is bristling with test tubes, huge ovens with inch-thick glass doors, and blackboards covered with the hieroglyphics of the world of tomorrow. It is here that the 10-part TV series was filmed.

While waiting for Dr. Seaborg and his band of strolling players, I couldn't help seeing a sign at the door which read: "If Hands Are Contaminated, Use De-Contamination Kit. If Feet Are Contaminated, Put On Booties."

To make matters worse, there was a sinister bubbling noise in the background that sounded as if one of the nuclear chemists had gone to lunch and left some uranium boiling on the stove. There was no place to sit and I was afraid I'd back into some machine and change the course of the world.

Finally Dr. Seaborg arrived—a genial, uneasy giant of a man in a wrinkled blue suit. After spending a good many years of my life interviewing the tinsel riff-raff of American show business, the clowns, the vacant-headed beauties and the empty personalities that have become famous overnight, it was a thrill to be in the same room with a truly great man.

To give you an idea of Dr. Seaborg's accomplishments, do you recall memorizing a chart of the known elements as a part of Chemistry I-A? They have been described as "the basic building blocks of everything on earth." Since 1939, a dozen new elements have been discovered. And Dr. Seaborg is the co-discoverer of eight trans-uranium elements plus the important isotope Uranium-233.

But Dr. Seaborg's activities aren't confined to matters of the intellect. As proof of this, I have only to mention that he is UC's faculty representative on the Pacific Coast Conference.

DR. SEABORG is charming and slightly shy, like many distinguished men. Part of this charm plus an enthusiasm for his work has rubbed off on the TV series, the first of which was previewed this week. The films, produced by KQED, will be shown on that station starting January 11, with two performances of each program every Friday. They will be distributed to 25 other educational TV stations at the same time.

"The Elements" is a fine feather in KQED's hat. As a television "first" the series will attract world-wide interest, and is already being called "the most outstanding science program to come to the public's attention."

I hate to end this lofty essay on a slightly lower plane, but I must admit that, while the introductory show held my interest for the entire half hour, I didn't understand one thing in it.

But that figures. If it were easily explained, every kid in the block would be making his own atomic bombs.

DAVID DIETZ—

Sunny Californium Lights Exploding Star

SAN FRANCISCO — The sudden flare of light accompanying the appearance of a supernova, the most gigantic explosion known to occur in the universe, is due to "sunny californium."

Once a century in each galaxy in the universe a star blows up with such violence that nothing is left but great shreds of gaseous cloud. Astronomers call the event a supernova.

The first one on record occurred on July 4 (of all dates), 1054, and was duly noted in the Chinese annals. The Chinese astronomers recorded that it flared up to a brilliance exceeding every star and planet in the heavens and then faded to just half its new brilliance in exactly 55 days.

Since then, two more supernovae have occurred in our own galaxy and astronomers have spotted additional ones in the other exterior galaxies or spiral nebulae. They all obey the 55-day law.

By now, I am sure, you are growing restless about that "sunny californium" business.

Dr. Glenn T. Seaborg, who shared the Nobel



prize with Dr. E. M. McMillan for the wartime discovery of plutonium, has been engaged ever since in creating transuranium elements, chemical elements beyond uranium in the atomic table.

In 1950, Dr. Seaborg and his colleagues at the Radiation Laboratory of the University of California, created element No. 98 which they christened californium after the university and the state.

More recently they established that californium has a half-life of 55 days. This means that half of a given quantity of californium will disintegrate into lighter elements in 55 days.

It remained for Dr. W. A. Fowler of California Institute of Technology to put the supernovae and californium together.

In the terrible explosion of the supernovae, temperatures are so high and the outward rush of neutrons so great that transuranium elements are created, he believes.

Californium dominates the outer shell of the exploding star and accounts for its great brilliance. But since half the californium present disintegrates in 55 days, the light from the supernovae drops in half in just the same period.

DEC 13 1956

DAVID DIETZ—

Giant Device to Speed Atomic Creation

SAN FRANCISCO: A new giant atom-smasher nearing completion at the Radiations Laboratory of the University of California will be used by Dr. Glenn T. Seaborg in his drive to create heavier chemical elements than any now known on earth.

The new device, known as the Hilac, is expected to go into operation early in 1957.

I made the journey to the laboratory to talk with Dr. Seaborg about his plans.

The laboratory consists of a group of buildings on Radiation Hill behind the university campus. From it one has a magnificent view across Berkeley and the bay to San Francisco on the other side of the water.

Largest of the buildings is the huge structure housing the bevatron, the world's most powerful atom-smasher. Hilac is smaller, but it is still a giant among giants and it was designed specially for such projects as that of Dr. Seaborg.

The name is a contraction of its full appellation, namely, heavy ion linear accelerator.

In the cyclotron and such improved and



enlarged versions of it as the bevatron, the stream of subatomic particles is whirled around in a circle, gaining energy with each revolution.

In the linear accelerator, the subatomic beam is speeded in a straight line. Hilac, being built at a cost of \$1,250,000, will send the beam racing through a huge tube 108 feet long and 16 feet in diameter.

Most linear accelerators speed up beams of electrons, protons, or alpha particles. Protons are hydrogen nuclei and alpha particles are helium nuclei.

The new device is called a heavy ion linear accelerator because it will furnish beams of heavier nuclei. These are known technically as heavy ions.

It will accelerate the ions with energies equal to 10 million electron-volts for each particle in the nucleus. The heaviest ion which will be used is that of silicon. Since the silicon nucleus contains 28 particles, this means the beam will have an energy of 280 million electron-volts.

Dr. Seaborg told me that there will be a better chance of creating new transuranium elements by using these heavy ions as bombarding particles.

DEC 13 1956

Science potrzebie

Mesic molecule, Seaborg appointed

Scientists in the University Radiation laboratory recently announced the observation of a new kind of nuclear reaction that yields energy and is akin to thermonuclear reactions.

The Atomic Energy commission, which finances the large program of fundamental research in the laboratory, simultaneously announced the discovery.

"Catalyzed nuclear reaction" is the way the new phenomenon is described. This adds a new method of making a nuclear reaction take place to the two previously discovered methods. The older methods are to induce thermonuclear reactions or to bombard nuclei with other nuclear particles from accelerators like cyclotrons or nuclear reactors.

In order to have a nuclear reaction two nuclei must touch. The new discovery is a way of pulling two nuclei together so a proton and a deuteron can combine to form helium 3 with the release of 5.4 million electron volts energy. This pulling together takes place in a "mesic molecule."

In a normal molecule, electrons weakly pull the nuclei of the component atoms together. But the electron can be replaced by a much heavier particle, the negative mu meson, which binds the two nuclei closer because it is 210 times heavier than an electron and circles the nucleus at only 1/210 the distance of an electron.

The reaction does not consume the mu meson; it is ejected from the molecule by the energy released. The meson is then free to catalyze more reactions in a chain fashion.

The scientist said, however, that at present the reaction is only a laboratory phenomenon because the chain of catalyzed reactions cannot continue long enough to generate commercially useful amounts of power. The mu mesons decay into other particles after two millionths of a second.

The observations were made in

students of track photographs taken in the 10-inch hydrogen bubble chamber. Scientists expected all mu mesons that came to rest in the hydrogen would simply decay since there was excitement.

However, it was noticed that occasionally a particle resembling a mu meson came to rest. Instead of decaying, it flung out another particle that also looked like a mu, went a short way, came to rest and decayed.

In some of the photographs there was a gap between the two mu-like tracks. Fifteen of these gaps were found before the mystery was explained. Apparently, at first the original mu meson will form a mesic atom with a proton. However, a mu meson will jump to a deu-

teron if one is available.

When this exchange occurs, the new deuteron mesic atom, neutral electrically, thus makes no track and will drift away from the exchange point. The drift of the neutral mesic atom accounts for the gap. At the end of the gap the deuteron mesic atom combines with a proton, and the catalyzed nuclear reaction takes place.

The result is that shortly after a mu comes to rest in hydrogen, it holds a deuteron and a proton together in the form of a tiny molecule. They soon fuse to form helium 3. The mass of helium 3 is less than the combined mass of a proton and deuteron, and the difference, 5.4 million electron volts, is available as energy. This energy is the same

energy that is released by the sun, or during thermonuclear reactions.

SEABORG APPOINTED

Nobel laureate Glenn T. Seaborg was appointed as senior advisor in the sciences for the Educational Television and Radio center, H. K. Newburn, president of the Center, announced recently.

Seaborg, a University chemistry professor, is the "star" of the National Educational Television series, "The elements," a series of 10 programs set in the Radiation laboratory of the University. Seaborg discusses in layman's language the chemical elements and how are put to use.

As senior advisor in sciences, Seaborg will consult with Center program officials in the development of educational television program science, one of the Center's main areas of programming.

CANCER TREATMENT

John H. Lawrence, director of the Donner laboratory of the University, administered an artificially produced radioactive isotope to a cancer patient for the first time 20 years ago on Christmas eve.

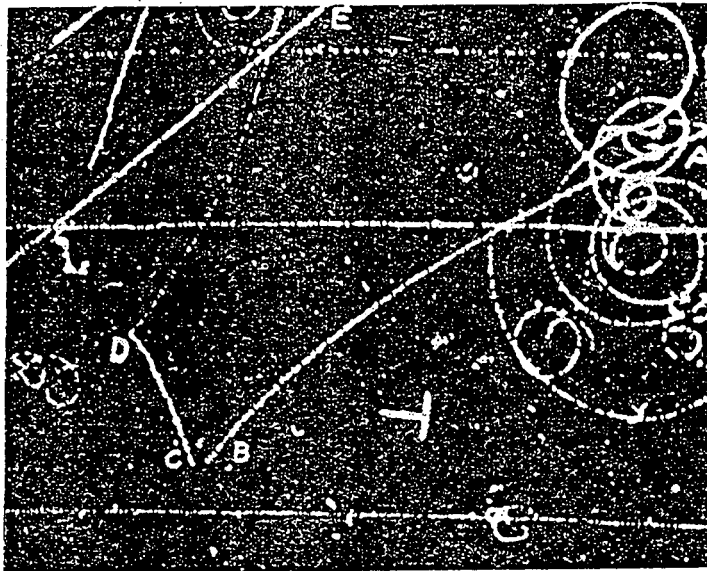
The radioisotope was phosphorus 32 made in the 37-inch cyclotron. Until 1936 this cyclotron could not make radioisotopes in large enough quantity for use in treatment.

The Christmas Eve patient was a 28-year-old woman with chronic leukemia. There is no cure for the disease, but studies show that the method has usually extended the comfortable life of these patients.

Dr. Lawrence reported that the first clear-cut control of a disease with radioisotopes was in the case of polycythemia vera, a blood disease. The results are comparable to the control of diabetes with insulin. These patients have a near normal life expectancy.

Radioisotopes are useful for the treatment of Graves' disease, some thyroid cancers, some skin cancers and in the palliation of cancers of the chest, uterus, prostate and abdomen.

The 37-inch and 60-inch cyclotrons have produced radioactive isotopes for research and therapy for many scientists. The isotopes are shipped regularly throughout the world.



NUCLEAR REACTION reported at the Monterey meeting is shown as photographed in the hydrogen bubble chamber at the Radiation laboratory. Starting at A is a mu meson. When it has moved to B it changes to a mesic atom which, not having a charge, leaves no track as it moves to C, where it fuses a deuteron and proton into helium, with the ejection of another mu meson, which moves to D, where it decays to an electron and moves out of the field E.

KQED to Launch Seaborg Science Series Tomorrow

By JAMES ABBE *Oakland Tribune*
1/10/57

Tomorrow KQED will launch the first of 10 half-hour weekly programs in a series called "The Elements." Dr. Glenn T. Seaborg, University of California scientist and Nobel Prize winner, will be featured in the series. Tomorrow's program will be broadcast at 4 p.m. and again at 7:30 p.m.

Almost simultaneously with tomorrow's premiere of the filmed series, Dr. Seaborg himself will be receiving the 1957 Perkins Award, one of the highest awards in American industrial chemistry at a dinner at New York's Waldorf Astoria Hotel.

Even before its premiere on KQED (to be followed later on 21 other educational stations nationwide) "The Elements" has been acclaimed by the scientific press of the nation.

This non-science-minded columnist was one of privileged press members who witnessed the first of Dr. Seaborg's series screened at U.C.'s Radiation Laboratory. Take it from one not versed in scientific matters, we are the very people Dr. Seaborg is out to inform. It is an experience to be exposed to the information and demonstrations which this famous chemist offers free on TV.

UC Chemist To Speak Here Today

Seaborg To Discuss Scientific Training Need At Institute

Dr. Glenn T. Seaborg, a University of California chemist, Nobel Prize winner and co-discoverer of plutonium, will speak here today on the need for more scientific training in the United States.

He will address the first San Diego institute to be presented by the University of California. Seaborg will speak at a program at 10:30 a.m. in the Konai Kai Club on Shelter Island. The program is open to the public. A registration fee will be charged.

Seaborg was head of a group of University of California scientists who, early this month, studied the San Diego area as a site for a graduate scientific branch of the university.

ENLARGEMENT PLANNED

The plan the group considered called for enlargement of the campus of the Scripps Institution of Oceanography.

Seaborg and Dr. Edwin McMillan, another University of California scientist, won the 1951 Nobel prize for work on elements created by the transmutation of uranium. In addition to plutonium, they discovered neptunium, curium, berkelium and californium.

Dr. Clark Kerr, chancellor of the university, will address a luncheon meeting on "Preparing Youth for College Today."

In the afternoon, Dr. Arthur

TV Show on Elements Stars Nobelist Seaborg

➤ AN EFFORT to present a picture of the true structure of the world and its surroundings will be made in a series of educational television programs featuring Dr. Glenn T. Seaborg, Nobel Laureate and co-discoverer of plutonium and other synthetic elements.

The television series, produced by San Francisco's station KQED, will be nationally distributed beginning this month by the Educational Television and Radio Center, Ann Arbor, Mich., through educational TV stations.

The title of the series of ten programs is "The Elements." It concerns the characteristics of the fundamental building blocks of the universe, the 101 elements, how they were discovered, how they are put together to shape the world of millions of substances known to man.

Dr. Seaborg is the discoverer of more of these fundamental building blocks than any other man in history. He participated in the discovery of eight elements, all synthetic, starting with plutonium.

Science News Letter, January 5, 1957

L.A. Mirror-News



NOBEL PRIZE WINNER Dr. Glenn T. Seaborg appears on KNXT's "Journey" Sunday, 1/11/56

FAMILY HOUR

C. Turner, chairman of the division of social sciences at the Riverside campus, will speak on "New Phases of International Politics."

A "family hour" will conclude the institute. This will be a question and answer period.

The San Diego County Alumni Club of the university is sponsoring the institute. Pat Hyndman is president of the club.

The institute is planned by a committee of which James Archer is chairman.

Dr. Seaborg Urges 'Pure' Research

Special to The Chronicle

NEW YORK, Jan. 11
America would profit greatly by doubling its investment in basic research and cutting away the red tape binding talented scientists, Dr. Glenn T. Seaborg said here tonight.

The Nobel laureate and professor of chemistry at the University of California said this would buy "the greatest bargain the American people have ever had."

Dr. Seaborg made his remarks in accepting the Perkin Medal of the Society of Chemical Industry. The medal is the outstanding recognition of achievement in American industrial chemistry.

MOTIVATING FORCE

"The underlying motivating force in basic research is intellectual curiosity, and this curiosity is to be rated with the highest qualities of mankind," he said.

"The investigator may be a thoroughly disreputable character in many ways, the intellectual curiosity may belong to his boss or his professor rather than to him, but somewhere behind the work he does is desire to find out why or how or what."

Research with a precisely stated goal is not basic, Dr. Seaborg said. An investigator who is not free to make radical changes in his program to pursue new questions that arise is not doing basic research.

SMALL PROJECTS

Unfortunately, he said, the administrators of the \$4 billion now being spent yearly on research have not found a way to avoid the "small project" system that covers financing of most research.

The result, he said, is a great deal of "red tape" that robs the "freedom of the talented investigator to wander

off into really uncharted regions of intellectual and scientific endeavor."

He added:

"I feel that basic research conducted by universities would be more efficiently done and more likely to reach beyond limited objective studies if lump sums of money were provided . . . rather than disbursed piecemeal to small projects bearing specific titles."

The basic research lying ahead of America's scientists is monumental, he said.

"No one doing research today on the new subatomic particles in physics can have the slightest doubt that what we know about atomic nuclei is but a tiny speck compared to our ignorance," he said.

The first episode in the KQED series on "The Elements," starring the distinguished Dr. Glenn Seaborg, will be seen today on Channel 9 at 4 p. m., with a repeat at 7:30 p. m. At the same time the film is being shown Seaborg will be in New York at the Waldorf Astoria accepting the Perkins Award in the field of industrial chemistry.

The stars are piling up for the February 4 Producers Showcase version of "Mayerling." In addition to Mel Ferrer and Audrey Hepburn, there's Raymond Massey, Diana Wynyard and Judith Evelyn. Anatole Litvak, who directed the original French film of same name, will also direct the TV.

Terence O'Flaherty Cd.
S.F. Chronicle
1/11/57

Berkeley Daily Gazette Dr. Seaborg Wins Coveted Award

Dr. Glenn T. Seaborg, professor of chemistry at the University of California and Nobel Laureate, will be presented tonight with the Perkin Medal by the American Section of the Society of Chemical Industry at the Waldorf Astoria Hotel, New York City.

The medal, one of the high honors of the American chemical industry, is presented annually for contributions in this field. Dr. Seaborg, who is in the East especially to receive the honor, was the leader of the group of scientists who laid the foundation for the industrial production of plutonium during World War II.

SEABORG VISIONS WIDER RESEARCH

Calls Doubling Our Present
4 Billion Outlay a 'Bargain'
—Receives Chemist Medal

By ROBERT K. PLUMB

The American people could put twice as much money into basic scientific research as is now spent and find this "the greatest bargain" they ever had, according to Dr. Glenn T. Seaborg of the University of California.

Dr. Seaborg, a Nobel Laureate and Professor of Chemistry at the Berkeley campus of the university, received the Perkin Medal of the American Section, Society of Chemical Industry, at a dinner in his honor last night in the Waldorf-Astoria Hotel.

The nation's total research and development expenditure now, Dr. Seaborg said, is about \$4,000,000,000 a year. This includes money spent by government, industry, universities and other nonprofit institutions.

It is difficult to distinguish between "basic" studies and research done with immediate, usable goals in sight, Dr. Seaborg declared. But he estimated that no more than 5 to 10 per cent of the total annual budget of \$4,000,000,000 was used for truly "basic" research.

"It is my opinion that this proportion and amount of money is much too small," the chemist commented. "I believe that we need and should work toward an expansion by something like a factor of two as soon as possible."

"The efficient use of money for basic research at such an increased level, I believe, is easily possible in spite of the shortage of scientists. The results would not go up by a factor of two with a doubled budget, but the increase would be so large that this would be the greatest bargain that the American people ever received for their money."

Dr. Seaborg suggested that the university would remain the center for basic research. The administration of funds from university budgets has generally favored fundamental studies, he said.

But he found new problems posed with the rising costs of basic studies, particularly in the physical sciences, increasingly supported by agencies outside the university. These sources include private corporations and foundations, the National Science Foundation and state and Federal agencies such as the Office of Naval Research and the Atomic Energy Commission.



HONORED: Dr. Glenn T. Seaborg of the University of California. He received the 1957 Perkin Medal of the American Section of Society of Chemical Industry.

Brake on Individual Initiative

"The sizable amounts of money these agencies have put into research and development have unquestionably been a very strong positive influence on the growth of basic research," he went on. "Furthermore, the men who have administered these funds have had a fine appreciation of the role of basic studies."

"However, in their dual responsibility to the scientist on the one hand and to the taxpayer or stockholder on the other, it has not yet been possible to work out mechanisms for the disbursement of research funds that avoid the tendency of the small project system, with all its red tape for reviewing and referring and project justification, to take away the freedom of the talented investigator to wander off into really uncharted regions of intellectual and scientific endeavor."

He also suggested that the creative efforts of scientists might be increased if universities provided help for leading investigators. For instance, he said, central electronics shops for construction and servicing of complex instruments might be established. Central radioactive counting devices, computer adjuncts, biological laboratories and other facilities should be set up, he said.

Dr. Seaborg was honored for chemical studies that have added eight new chemical elements to the list known to man. He is a co-discoverer of Plutonium.

He was introduced by Lewis Strauss, chairman of the Atomic Energy Commission, who said the Government and millions of Americans should be grateful to Dr. Seaborg for his work on plutonium.

Dr. Glenn Seaborg, U.C. Nobel Prize winning chemist, will be back on KQED at 7:30 tonight with the second of his TV series which is subtitled "Atoms into Molecules."

Using checkers and thumbtacks (that's what is promised) Dr. Seaborg will explore the structure of the basic unit of nature, the atom.

This series about "The Elements" has already attracted attention nationwide and been written up in national magazines. We get to see it before the rest of the country does.

Oakland Tribune, 1/12/57

Day and Night

By DWIGHT NEWTON

OUR FRIEND THE ATOM . . .

S.F. Examiner
1/23/57

This is the day "Disneyland" makes the atom meaningful to all of us (KGO-TV, 8 p. m.). Learned scientists have tried valiantly but futilely to do it.

Dr. Walter Teller did a profound three part series on "The Atom." Dr. Glenn Seaborg is doing a series on "The Elements." Excellent for advanced scientific students. But how many among us are?

These great men find it difficult to reduce their specialized knowledge to everyday terms. Their limited budgets forbid presenting scientific subjects with entertaining simplicity as the Bell System did with its wonderful "Our Mr. Sun."

Now, at last, "Disneyland" has done it with "Our Friend The Atom." It devoted two years to research, it called upon all the great scientists of our time, it translated its findings into the unsurpassed story telling techniques of the Disney studios.

This program deserves your full attention. This I have seen. This I recommend.

It tells Scheherazade's story of the Fisherman and the Genie—a parallel to Man and the Atom. Slowly, dramatically, interestingly—with pictures and drawings and narration—it traces atomic research from Democritus of old to the radiation laboratory of today.

It personalizes the atom, the molecule, the electron, the neutron, the nucleus. It stimulates your interest. It SIMPLIFIES its subject. It lenses the horrors of the atomic bomb, and the fabulous wonders of atomic energy for peace.

And in the end, it makes three wishes for atomic energy.

Its narrator is Dr. Heinz Haber who also wrote the book, "Our Friend the Atom," published by Simon and Schuster. We urge you to see the show, then read the book.

Huntington Park Daily Signal 2/8/57

H. T. Seaborg, Father of Nobel Winner, Dies in S. G.

The father of Prof. Glenn Seaborg of Lafayette, former Nobel Prize winner and a noted atomic scientist, died Wednesday in a local hospital.

Funeral services for H. Theodore Seaborg, 76, of 9237 San Antonio, South Gate, will be held tomorrow at 2 p.m. from the Chapel of Biby and Belyea Mortuary, with Dr. Herman Spruit officiating. Burial will be in Inglewood Cemetery.

Born in Michigan, the father came to California and the South Gate area 35 years ago. A machinist, he was a member of the Mayflower Lodge of the Swedish Vasa Order.

Other survivors include the widow, Selma; a daughter, Jeanette of South Gate; two brothers, Henry and Lawrence of Michigan; two sisters, Mrs. Lillian Larson and Mrs. Esther Williams, both of Michigan, and five grandchildren.

L.A. Examiner

H. T. Seaborg, Kin of Nobel Winner, Dies

2/8/57

Funeral services for H. Theodore Seaborg, 76, father of Nobel Prize winner Dr. Glenn T. Seaborg, will be held at 2 p.m. tomorrow at the chapel of Biby and Belyea Mortuary, 8665 California avenue, South Gate. Interment will be in Inglewood Cemetery. He lived at 9237 San Antonio avenue, South Gate.

His son, Dr. Seaborg, is professor of chemistry at the University of California at Berkeley.

Besides his son, he leaves his widow, Selma, a daughter, Jeannette, of South Gate, and five grandchildren.

Portrait of a great man. Berkeley Gazette 2/26/57
Dr. Glenn T. Seaborg, UC professor of chemistry and Nobel Prize winner, has been fascinated with a 2-year-old Greek orphan boy recently adopted by a family in Seaborg's Lafayette neighborhood.

The little fellow is rapidly learning English by the simple process of actively playing with the other five children of his new parents, touching, tasting, exploring, overturning, investigating anything and everything. And a visit by a tall man who lives down the road and who manipulates giant atom smashers for a living is merely an opportunity to crawl into his lap and learn that the curious object in his lapel pocket is called a sliderule.

"There's the answer to our need for future scientists," said Seaborg. "We just have to stop cutting off the greatest birthright a child has—his curiosity. Any child born with all the parts of his body in good working order can learn to make an atom smasher figuratively jump through hoops if someone doesn't make him afraid to use his brain to ask questions—questions about anything and everything."

Berkeley Daily Gazette

Seaborg to Address Education Parley

4/5/57

"Science: Its Place in Education and in Society" will be the subject of Dr. Glenn T. Seaborg, University of California Nobel Laureate Chemist, when he addresses tonight's dinner meeting of the third Pacific Coast conference of the Secondary Education Board, being held at the St. Francis Hotel in San Francisco. He will be introduced by Dr. James Hart, vice chancellor of the University, according to Mrs. Daniel Dewey of the Anna Head School, the conference chairman.

Earlier today, more than 400 delegates at the conference heard Harry Stoops of the California Disaster Center, Berkeley, speak on how independent schools can cooperate in civilian defense measures; Mrs. Russell Prescott of Berkeley, area representative for the American Field Service, on student exchange programs, and students from the Anna Head School participate in a panel on student government.

SECTION MEETINGS

Tomorrow's section meetings will include one on the new Secondary School Admission Testing Program and the Gifted Student, under chairmanship of Daniel Dewey, headmaster of the Anna Head School.

"The interrelation of Schools" will be the topic on which Dr. John F. Gummere, chairman of the Secondary Education Board, will address delegates at the closing lunch tomorrow noon. Dr. Gummere's subject includes examples of how independent schools have pioneered, often just because they are "independent," in such programs as advanced college placement, the experiment in foreign language teaching under a Carnegie Corporation grant, and the new Secondary Education Admission Test program.

Dr. Gummere is headmaster of the William Penn Charter School in Philadelphia.

LABORATORY TOUR

At the close of the conference, delegates who made early reservations will board buses for special tours of the University of California's Virus and Radiation laboratories. Others will visit independent schools in the area, including Anna Head School here in Berkeley, which are holding open house tomorrow afternoon.

The Secondary Education Board, founded 32 years ago, has grown to a membership of 450 elementary and secondary independent schools in the United States. Its purposes are to promote high academic and ethical standards, to encourage cooperation among independent schools by facilitating an exchange of information and experience, and to strengthen friendly relations with public schools by encouraging members to give public schools the benefit of their experience and unexcelled opportunity to experiment, as well as to be warmly receptive to the ideas and experiences which the best public schools can offer.



NOBEL PRIZE winner Glenn Seaborg of UC warily studies the "How to Control the H-Bomb" display at yesterday's judging of the fourth annual Bay Area Science Fair. He was one of 50 judges.

S.F. News

4/5/57

2 E. Bay Youths Win Science Fair Honors

See EDITORIAL, "Budding Genius," Page 16.

Even the scientists judging the fourth annual Bay Area Science Fair at the Academy of Sciences in Golden Gate Park yesterday had trouble understanding many of the 356 complicated displays.

They had even more trouble choosing a winner.

As Judge Larry Varblou of the Stayner Corp. of Berkeley put it, "They're all superb."

PRESENTATION of awards will take place tonight at 8 in the Academy's Morrison Auditorium with William Shockley, winner of the 1956 Nobel Prize in physics, distributing the awards.

The fair will be open free to the public from 10 a.m. to 10 p.m. Saturday through Wednesday.

Another Nobel Prize winner, Glenn Seaborg, UC nuclear physicist, was moving along smoothly through the displays yesterday, checksheet in hand, when he came across an innocent-looking tic-tac-toe computer.

SEABORG ADMIRED the electronic game for a moment and decided to give it a try.

He tried once, twice, three times. Every time he pressed a button lighting up a square on the board, the machine made its move. And every time the machine won.

But Seaborg noticed that the machine accidentally lit up two squares once when it should have made only one move.

"THERE—THAT explains it," he said. "The machine cheats." It was nonetheless sufficiently

impressive to win for its builder one of the four grand prizes.

He is 17-year-old Edward McLaughlin of Encino High School in Alameda.

Other Grand Prize winners are Don Klose, sophomore at Albany High School, a study of the regeneration of months; and in the junior high division, Robert Escobar of Luther Burbank, penetration of lanolin oils, and William Carl Schwarze, Herbert Hoover, the evaporation preventative powers of some chemicals.

McGLAUGHLIN and Klose, as high school winners, will represent the Bay Area at the National Science Fair in Los Angeles.

Among the other projects entered was one which attracted the attention of another judge, Francis Filice of USF.

"This is terrific," he said. "I don't watch that child scientist on TV (Robert Strom on 'The \$64,000 Question' because it gives me an inferiority complex. Imagine how I feel after seeing these displays."

Claudio Alvarez-Tostado of Stanford was baffled by a computer that solves mazes.

HE SPENT several minutes trying to figure how the machine enabled a track of lights to find its way across the board. Finally he looked over the intricate wiring system and came upon the solution.

"It's very good," he told his associates, "almost unbelievable."

And so it went. There was an electronic servant, a model X-ray machine exact in every detail, a home-made six-power telescope, and even a display on how to control the H-bomb.

SCIENCE FAIR AMAZES SCIENTISTS

Show for 'Young Genius'

Will Open Tomorrow

S.F. Examiner 4/5/57

By JOHN F. ALLEN

An automatic tic-tac-toe machine built by a 15 year old boy had the gall yesterday to whip Dr. Glenn T. Seaborg, the Nobel Prize-winning nuclear chemist, and then—adding insult to injury—to give him an electronic razzberry.

"I think it cheated," he said, pretending indignation, and then added:

"It's incredible to think that an 11th grader could do this." This unstinting admiration



CARL E. McLAUGHLIN

Tic-Tac-Toe Inventor

of a great scientist of the present for a potentially great one of tomorrow was limited neither to the University of California chemist nor to Carl E. McLaughlin, of Alameda's Encinal High School, the human brain behind the electron brain that did Seaborg dirt.



SEABORG BEATEN—Dr. Glenn T. Seaborg, Nobel Prize nuclear chemist, is defeated by tic-tac-toe machine designed by Carl E. McLaughlin of Alameda's Encinal High School.

JUDGING DAY.

This was judging day for the 356 entries in the annual Bay Area Science Fair, which opens to the public tomorrow at the Academy of Sciences in Golden Gate Park.

Young McLaughlin's entry won the grand prize in the senior division.

Seaborg was one of a score of topflight local scientists who acted as judges (another was Physicist Edward Teller, the "father" of the H bomb), and there wasn't one of them who didn't stand in wondering respect before most of the entries.

Anyone who has any idea that these projects entered by junior and senior high school students are simple or child-

like gadgets must guess again. Almost without exception, they are mature and amazingly erudite and they bode great good for the future of the country's scientific standing.

SPECTRUM OF SCIENCE.

They also provide a happy experience for anyone with the impression that all teenagers are delinquents.

The exhibits range the spectrum of science.

Like one which shows the effects of the new tranquilizing drugs on rats, by alternately running sedated and nervous animals through an intricate maze.

And across the aisle, thin mice and fat, demonstrate the outcome of a test of the effects of diet deficiencies—an experiment so beautifully done and carefully controlled

Teacher Meet Scans Problems of Students

By TIM ADAMS
S.F. Examiner
4/6/57

Some children grow too fast, some have serious conflicts with their parents, and some are so spoiled that they think they can do well in school without cracking a book.

These and many other reasons were offered here yesterday to explain why Johnny doesn't always do as well as he could in school, and what teachers can do to help him out.

Those who diagnosed the causes and prescribed the cures were teachers attending the opening session of the Third Pacific Coast Conference of the Secondary Education Board, a national association of independent schools.

HARD PROBLEM.

In a sectional meeting in the St. Francis Hotel's Colonial Room, some 200 teachers first heard two educators and a pediatrician give their ideas, then participated in a lively question-and-answer period following the presentation.

Dr. George H. Schade, a pediatrician who teaches at the University of California Medical School, said the problem of finding out what's wrong with a student who is not "achieving" his potential can be difficult indeed.

Each child, he said, has a system of psychological defenses geared to his own needs "and he guards his own feelings as well as we adults."

FIRST TO DOCTOR.

If the child seems to be having difficulty, he suggested that the parents send him first to a pediatrician or the family doctor to determine whether psychiatric therapy is needed.

Another panel member, Doane M. Lowery, president of Pasadena's Flintridge School for Boys, backed him up, saying that "many children are bedeviled (for poor work) at school and at home when the cause is beyond their control."

He cited such simple causes as a low blood sugar level, which can easily be rectified

through diet, and the common adolescent problem of "growing too fast."

Willis Stork, headmaster of the Polytechnic School in Pasadena and the third member of the panel, said there should be close teamwork between teacher, principal, physician and parent when such problems arise.

NOT A PROBLEM.

As the discussion came to an end, one teacher rose from the audience to ask about students who, by intense hard work, "are doing better than the tests say they can."

Should they be considered problems, too? the teacher asked.

"Not in my opinion," Doctor Schade replied. "Any child who is achieving should be allowed to proceed—and more power to him."

Last night, conference delegates heard Dr. Glenn T. Seaborg, Nobel laureate chemist from the University of California, ask educators to spike a long standing misconception about scientists.

To be a scientist, he emphasized, you don't have to be a genius.

There are geniuses in science, Doctor Seaborg admitted, but the main progress is made by people of ordinary talent who have the aptitude for mastering the fundamentals and who achieve things by learning how to follow the scientific method.

Atomic Stock Speculators Warned by Wall St. Expert

By JACK RYAN
Tribune Staff Writer

"Beware of financial fallout from nuclear explosions in Wall Street" is the warning of a New York investment banking expert on atomic energy.

This fallout, says Gordon R. Molesworth, atomic consultant to Harris-Upham & Co., may be from your pocketbook if you rush headlong into investments just because they mention atomic energy.

Molesworth voiced his warning yesterday afternoon at the final session of a two-day conference on atomic energy at San Francisco's Mark Hopkins Hotel.

But, so far, says Molesworth, paradoxically, most investments made on the strength of the word atom have been sound from a stock price rise standpoint.

If they stay sound, of course, he adds, is something else again.

THE MAGIC WORD

The most widely known of the atom's financial influences is that exhibited in the stock market. Some examples he noted were:

Bath Iron Works announced routinely the employment of a nuclear engineer. The company's stock promptly rose 25 per cent.

W. R. Grace & Co., the steamship operators, was reported to have found a rich uranium ore body in Peru. Their stock promptly took a jump. The company promptly labeled the report a hoax, but the shares maintained their new high ground anyway.

There are many others.

BUY ON IMPULSE

"Millions of Americans have bought shares in uranium and other atomic-connected companies strictly on impulse with virtually no study at all and with no counsel from experi-

enced advisors," the investment expert explained, and continued:

Molesworth advises that before you invest in a company's "radioactivity," check these three considerations:

1—How prominent are the company's nuclear operations in its whole business picture?

2—Is the atomic energy activity being carried on, actually a source of substantial profit?

3—Has the atomic energy activity of the company already been discounted by increases in the price of stock?

Two Metropolitan Oakland scientists gave voice to a problem that may well hamper the future of atomic energy in the U.S., as well as the world.

They are Glenn T. Seaborg, Nobel prize winning physicist at the University of California, and Dr. W. C. Rueckel, vice president of Kaiser Engineers.

Dr. Seaborg contends that the future of atomic power depends on a solution to the disposal of poisonous wastes from atomic furnaces.

UNSOLVED PROBLEM

Dr. Rueckel says that simply storing them in underground stainless steel tanks or dumping the waste in the ocean is only a temporary expedient.

The Kaiser scientist says it's up to the engineer to develop the solution to "this plaguing problem."

Dr. Seaborg says it's a clear case for basic scientific research.

Dr. Seaborg says too much of the Nation's scientific dollar is being spent on applied, practical research, rather than on the fundamental scientific probes which led to the fissioning of the atom.

"It is my opinion," says the famed scientist, that the 5 per cent of the total annual budget

devoted to basic research should be doubled.

Dr. Rueckel sees a bright and billion dollar future for the engineer in the atomic age.

MAJOR INDUSTRY

Just to name a few, he sees the production of heavy water as a major industry. Power reactors, using heavy water to modify their neutron reactions, he says, could very easily reach a capital investment of almost a half-billion dollars.

A similar future is possible, says Dr. Rueckel, for low temperature distillation of sea water to fresh water by means of reactors with low power density.

"A progressive engineering firm must be cognizant of changes in various fuels and be able to evaluate, design and construct the various nuclear power plants which will most assuredly be prevalent."

Dr. Rueckel says that accordingly, Kaiser Engineers has established a Nuclear Power Study Group within its Atomic Energy Division in order to study the technical and economic feasibility of various types of plants for the production of nuclear power.

Skin Game, Tic-Tac-Toe Are Child's Play to Them

By Jack Burby

Young scientists, through some happy mixup, have been blessed with the uninhibited snooping instincts of puppies.

A bit of research among the grand prize-winning exhibits at the Science Fair at the California Academy of Sciences in Golden Gate Park is bound to confirm this.

Take the case of the youngest winner, Robert Escobar, who was 12 years old on April 1.

He is an eighth grader at Luther Burbank Junior High School in San Francisco. He was watching a television commercial one night at his home at 14 Farallones street.

The announcer said lanolin was a great skin lubricator and Robert just naturally had to find out whether that was true and he won a grand prize.

Marguerite Hornbeck, Robert's science teacher, was totally and unscientifically thrilled by it all.

"All we can hope for in a project is a showing that the student has absorbed what he had heard in class," she said.

"But once in a while one of them will ramble off on his own and produce something like this," she said, giving Robert an impulsive hug.

Robert squirmed.

"I just wanted to find out about lanolin," he said.

To do this, he took time out from his chores as second baseman of the school baseball team, from his piano and saxophone and clarinet and turned out a professional job of classic research.

He used 12 fellow students for his test, weighing small dabs of lanolin, vaseline,

benzoated lead and cocoa butter, and smearing them on the back of the hands of the students. He covered the dabs with gauze patches, waited a few hours, then weighed what was left of each substance.

In each case, the skin absorbed more of the lanolin than of the other lubricants.

"Gosh, I never thought anything would come of it," he said. The whole project cost \$3 of his allowance and \$4 his father, Robert J., a salesman, chipped in.

With Carl E. McLaughlin, 15, the setting was different. His father, H. R. McLaughlin, of 115 Haight street, Alameda, is an engineer in the Office of Naval Research in San Francisco.

His project was a computer that cannot be beaten at the game of tic-tac-toe. He read an account of such a machine in a magazine 14 months ago and decided he could build one, too. His father coaxed about \$400 worth of relays out of the Pacific Telephone & Telegraph Co. They got a power unit and young McLaughlin went to work on the design.

The first step was three months of learning all there is to know about the mathematical possibilities in a game of tic-tac-toe.

The machine flummoxed Dr. Glenn T. Seaborg, Nobel Prize-winning scientist from the University of California who was a Science Fair judge.

"It is incredible to think an 11th grader could do this," he said.

Young McLaughlin, a slim, handsome youth who is a distance runner on his track team and a week end Explorer Scout, has two more projects in mind.

"I think I'll enter a biology project next time," he said. "And I've been wondering about a computer that could



Marguerite Hornbeck,
Robert's teacher

Youthful scientists showed off their prize-winning work at the Science Fair—and one gadget defeated Nobel prize winner Dr. Glenn T. Seaborg in a game of tic-tac-toe. Page 21.



ROBERT ESCOBAR
He uses Lanolin

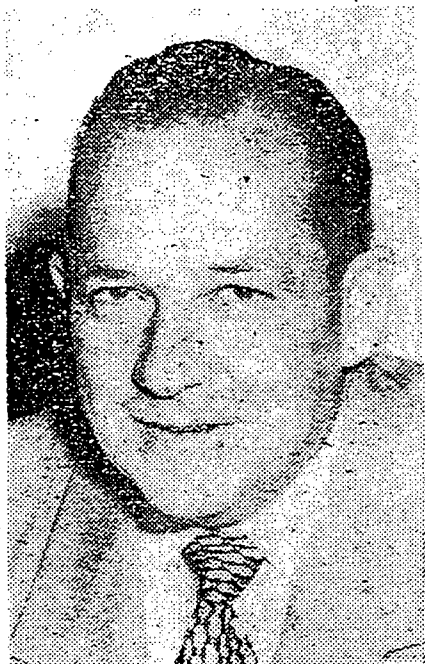
Graduate Accomplishment



WILLIAM C. ACKERMAN

Class: 1924

BILL ACKERMAN'S thorough knowledge of the ASUCLA comes from his association with the University, first as a student and athlete and then as a coach, physical education instructor and alumni representative on the student council. He is presently the guiding hand of ASUCLA, serving as its general manager.



WILBUR JOHNS

Class: 1925

WILBUR JOHNS has been associated with UCLA as student, athlete, coach and now as our top-flight athletic director since 1921, when he first set foot on the UCLA campus as a freshman.



AGNES DE MILLE

Class: 1926

NATIONALLY KNOWN choreographer, Miss Agnes de Mille received the UCLA Alumni Achievement Award for 1953. Her hits in the field of choreography include dances for "Oklahoma!," "Carousel," and "Tally-ho."



VICTOR R. HANSEN

Class: 1926

VICTOR R. HANSEN, a third-baseman for the Bruins during his college career, has only recently been appointed an Assistant Attorney General of the U.S. Formerly, he was a California Superior Court Judge, and during the war Adjutant General for California.



FRED HOUSER

Class: 1926

FORMER UCLA STUDENT body president, Superior Court Judge Frederick Houser is also a Regent of the University of California. Houser served as Lieutenant Governor of California for the term 1942-46.



BRUCE RUSSELL

Class: 1926

WELL-KNOWN EDITORIAL cartoonist for the Los Angeles Times, Bruce Russell is the artist who contributed the drawing for the front page of this edition. Russell also won the Pulitzer prize for journalism in 1945.



DR. RALPH BUNCHE

Class: 1927

IT IS SUFFICIENT to say that Dr. Bunche gained his fame as a mediator for the United Nations in the Palestine conflict of 1948. For this work, Bunche was awarded the Nobel Peace Prize.



JOHN CANADAY

Class: 1927

JOHN CANADAY was the second UCLA Alumni Association president to serve on the Board of Regents, and he personally drafted the revisions which established the Chancellorship at UCLA.



M. PHILIP DAVIS

Class: 1928

M. PHILIP DAVIS is a practicing attorney in Beverly Hills. His background includes a stint as State Legislator from 1944-46 and past president of the UCLA alumni association.



GLENN T. SEABORG

Class: 1934

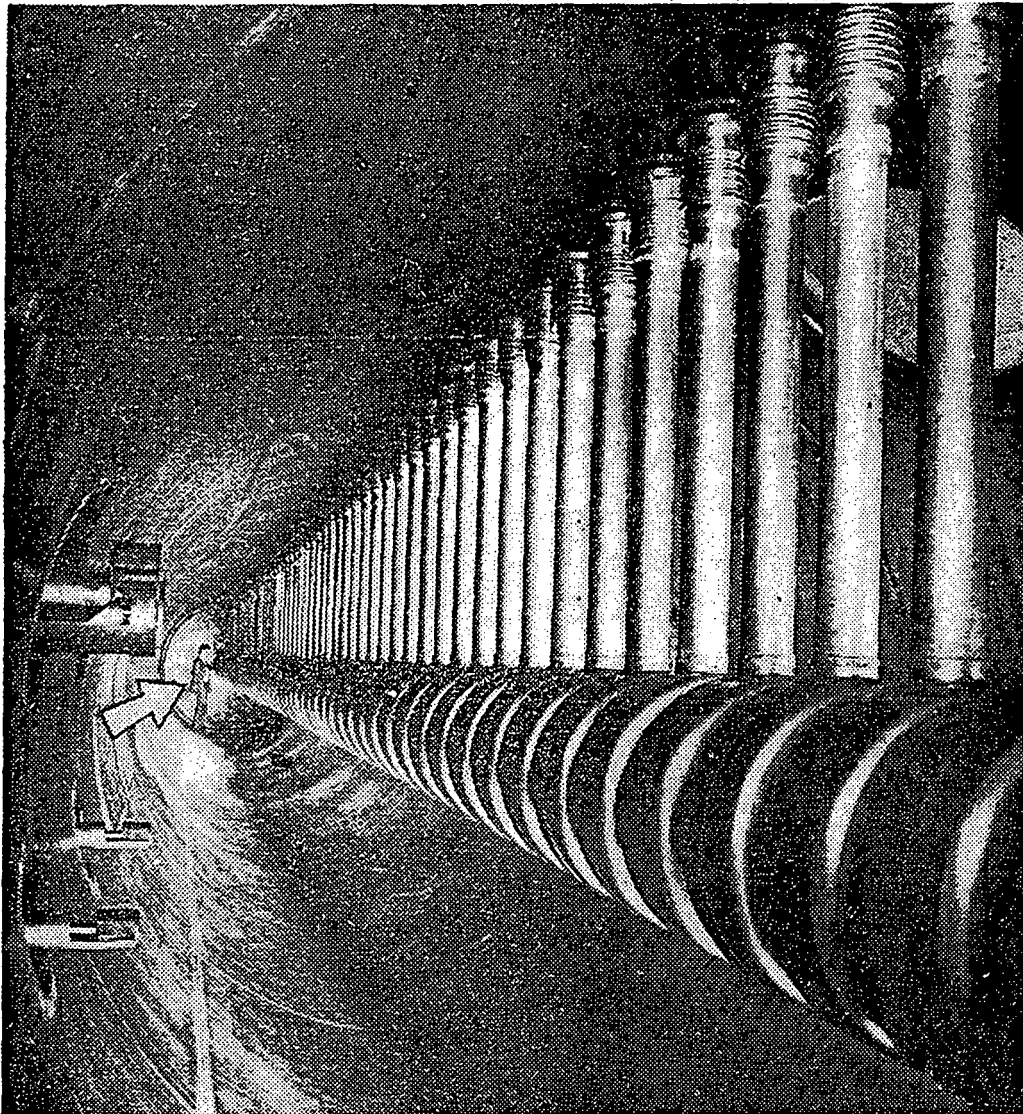
DR. GLENN T. SEABORG won the Nobel Prize in Chemistry, for his work on the Manhattan Project during the Second World War and for his work which led to the discovery of the radioactive element plutonium.



EDWARD CARTER

Class: 1935

ONE OF THE Regents of the University of California, Edward Carter is the youthful president of Broadway Hale Stores, Inc. One of his many other managerial tasks is the presidency of the Cavendish Trading Corporation.



HEAVYWEIGHT—This is the interior of U. C.'s new atom smasher. Fragments of matter are hurled through doughnut shaped "drift

tubes" that extend length of "gun's" barrel. Man (arrow) at end of the barrel gives an idea of the size of tank —112 feet in length, 10 in diameter.

S.F. Examiner 4/24/54

New Atom Gun

Revealed by UC

By WILLIAM BOQUIST

A massive new piece of atom smashing artillery was publicly unlimbered yesterday by proud University of California scientists, who expect it to blast open a whole new field of nuclear knowledge.

The essential innard of the new tool is a 112 foot barrel, down which bullets, formed of the atoms of heavy elements, will be fired at more than 25,000 miles per second.

When they smash into their targets they are expected to fuse with other atoms to form a whole series of synthetic chemical elements of a weight and intricacy never before known on earth.

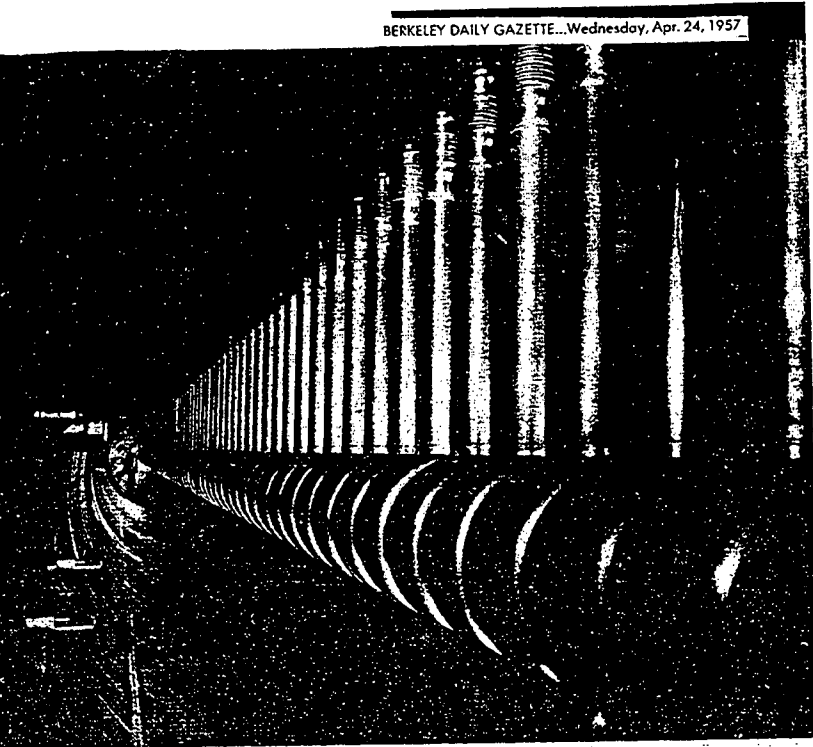
Named HILAC—

This big gun is called a Heavy Ion Linear Accelerator (HILAC), and some notion of its importance to the world of

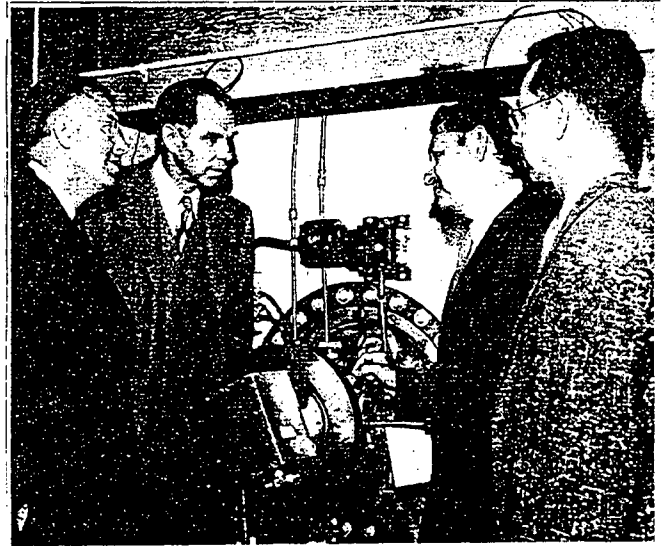
physics can be gained from the proud-fatherly words of Glenn T. Seaborg, the Nobel laureate:

"I wouldn't be a bit surprised to see some very fundamental discoveries of the behavior of the atom come from these studies."

This is the Seaborg who has manufactured more artificial elements than any other man. When he began with other of U. C.'s famed atom smashers

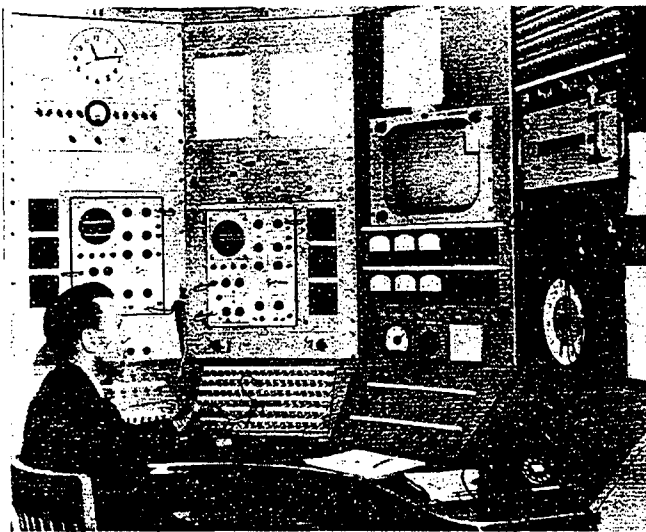


Photograph shows the interior of a component of the Hilac atom smasher at the University of California. Heavy fragments of matter are hurled through the doughnut shaped "drift tubes" that extend the length of the atom gun's barrel. Man standing at the end of the barrel gives idea of size of tank—90 feet long and 10 feet in diameter.



Nobel Laureates E. O. Lawrence, left, and Glenn T. Seaborg, second from left, listen as the workings of the new University of California atom-smasher are explained by Albert Ghiorso, who will conduct experiments on the machine, and Dr. Edward Hubbard, who supervised the development.

—Gazette photos



Warren Dexter sits at the complex control board of the new University of California atom-smasher called the Hilac, which is derived from its proper name of heavy ion linear accelerator.

New Type Atom Smasher Firing Away at UC Lab

Pioneer Research Expected From Machine

A new type \$1,700,000 atom-smasher, a linear accelerator designed for the study of the elements in the transuranium region including an attempt to synthesize atoms heavier than element 101, has gone into operation in the University of California Radiation Laboratory, it was announced jointly today by the Atomic Energy Commission and the University.

The machine, called the "Hilac," is now accelerating nuclei of nitrogen atoms (nitrogen 14) to energies of 140,000,000 electron volts.

The new instrument does not compete in energy with such ultra-powerful machines as the Radiation Laboratory's Bevatron, which accelerates protons, the nuclei of the lightest element, hydrogen, to 6,200,000,000 electron volts.

In contrast, the new atom-smasher is designed especially to accelerate the nuclei, or ions, of very heavy atoms. It is therefore called a heavy ion linear accelerator, or "Hilac."

The Hilac may permit the synthesis of elements heavier than mendelevium (element 101), the heaviest now known. Elements heavier than uranium, element 92, are all synthetic, and are obtained by transmuting uranium nuclei, step by step, into successively heavier atoms.

The instrument will permit a new type of exploration of nuclear forces, it will open up a new field of study of elements 84-90, and it will be used in studies of the effects on living cells of very heavy particles such as are encountered in cosmic radiation beyond the earth's atmosphere.

JOINT PROJECT

The machine represents, in part, a joint project between the University of California and Yale University. Yale and Berkeley scientists jointly developed the design of the machine, a duplicate of which is nearing completion now in New Haven. The research

emphasis at the two institutions will be different — Yale being chiefly interested in problems in physics and Berkeley giving priority to chemical transmutation experiments.

Chester Van Atta, physicist in the Radiation Laboratory, Berkeley and Livermore, has been in overall charge of the Berkeley development, which has been under the immediate supervision of Dr. Edward Hubbard, physicist. Dr. Robert Beringer is in charge of the Yale machine's development.

After two weeks to a month of adjustment and perfection of the machine's operation, the Hilac will be turned over to experimenters, chiefly the members of the Radiation Laboratory's chemistry division. Albert Ghiorso and Stanley G. Thompson, with the collaboration of Glenn T. Seaborg, Nobel Laureate and head of the chemistry group, will lead researchers in the attempt to synthesize super-heavy elements. University scientists have discovered or participated in the discovery of all elements heavier than uranium.

LIGHT NUCLEI

In the past these elements have been made generally by firing light nuclei, such as deuterons or alpha particles (nuclei of helium atoms), from the University's 60-inch cyclotron, into either uranium or synthetic atomic nuclei. For example, plutonium was made by shooting deuterons into uranium, while element 101 (mendelevium), was created after alpha particles were fired into the nuclei of element 99 (einsteinium).

With light nuclei, such as alpha particles, as projectiles, elements can be synthesized that are only slightly heavier than the original target element. These small steps up the periodic table apparently are no longer fruitful.

There are a number of difficult problems about synthesizing elements heavier than 101. As nuclei become heavier they become less stable, their half lives become shorter, the number of atoms that can be synthesized becomes smaller, and their detection becomes more difficult.

An example of these troubles is

the size of the target. With only a tiny number of element 99 atoms for a target, only about one atom per experiment was identified in the discovery of element 101.

With such minute numbers of atoms having very short half lives, identifying them before they disappear through decay is extremely difficult. In the case of 102, the scientists would expect even fewer atoms from alpha particle bombardment than in the case of element 101, and their half lives would be measured in seconds and fractions of seconds. To add to the problem, fission is the most common reaction that takes place in any bombardment that might produce element 102.

MORE HOPE

The Hilac provides more hope. The Hilac is designed to accelerate the nuclei of atoms ranging up to argon 40 (element 18). Therefore, it may be possible to add large fragments of matter to target material, bringing about big jumps up the periodic table in single transmutations. Thus the scientists can use a more plentiful target material—uranium, if they wish—insuring more hits and more reactions of all kinds, including possible transmutation to element 102.

One promising reaction might occur by firing nuclei of neon 22 atoms into uranium, 238. About 99.99999 plus reactions would be fission, but a few atoms of element 102 might be formed. Another possible reaction is the addition of oxygen 18 nuclei to curium (element 96) 244 nuclei to form atoms of element 104, which in turn would decay to element 102.

There are four major components of the Hilac, which has an overall length of 112 feet. The first component is a small Cockroft-Walton accelerator. In this instrument, in the case of nitrogen 14, three of the atom's seven electrons are removed so that the particle becomes charged and can be accelerated. It then receives a 350,000 volt push in the Cockroft-Walton.

UC Atom-Smasher: New Device Fired

UC Fires Its A-Smasher--- Huge Cannon

By Milton Silverman,
Science Editor

A powerful new atom-smashing cannon—a 112-foot device that fires atomic particles at speeds of more than 25,000 miles per second—is in action at the University of California, it was disclosed yesterday.

It is known as the HILAC, for Heavy Ion Linear Accelerator.

Shortly before midnight on April 11, it was turned on for the first time. A few hours later, the UC scientists revealed, a new type of atomic explosion was discovered.

"It was a kind of lopsided fission," one of them said.

A LOT OF ENERGY

"We fired a nitrogen particle at a uranium target, and out came atoms of thorium, oxygen, hydrogen and a lot of energy."

Unlike the cyclotron - type of atom smasher, which uses lightweight atoms — such as the hearts of hydrogen or

Continued from Page 1

helium atoms — and spins these in a circle to get them up to full speed, the HILAC uses heavier atomic particles and shoots them in a straight line.

The new device is now firing nitrogen particles.

In the future, the scientists predicted, it will be used to fire neon and argon particles.

"We can't give them very high energies — only about 140 million electron volts on a nitrogen particle," one researcher claimed. "But when these particles hit, they produce rather interesting results."

In the HILAC, the nitrogen particles are given a "take-off" charge in preliminary chamber, which gives them a 350,000-volt push.

Then they pass through a short "pre-stripping" chamber — a succession of 37 doughnut shaped tubes — where their energy goes up to 14 million electron volts.

Next they shoot through the "stripping" chamber — actually a curtain of mercury vapor — where electrons are stripped away from the speeding particles.

Then the particles go through the long "post-stripping" chamber — 68 more doughnut-shaped tubes—and get their energy boosted to 140 million electron-volts.

And finally they smash into the target — usually a thin sheet of uranium.

The HILAC is so carefully constructed that the beam of atomic projectiles is focused at the end into a spot less than a fifth of an inch in diameter.

According to Doctors Ernest Q. Lawrence and Glenn T. Seaborg of UC—both Nobel prize winners—the new machine will be used in at least three types of research.

1—Attempts to create new synthetic elements bigger

than atom No. 101, or mendelevium, now the heaviest atom known.

2—Studies of the new "lopsided fission" reaction and other new types of reactions which may show up.

3—Tests of the HILAC beam on living cells.

There is no indication that the HILAC will lead to the immediate discovery of bigger atom bombs, anti-atomic defenses, atomic motors or agents to cure disease.

To the Californians, perhaps the most intriguing goal is the creation of man-made super-heavy elements.

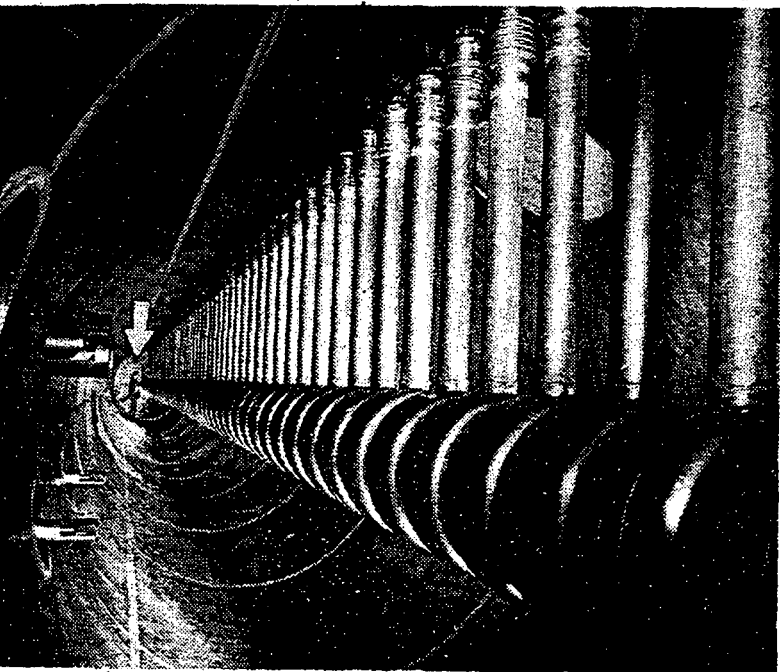
At the outset, the heaviest atom known was uranium, No. 92 in the list of elements. By using various cyclotrons, and lightweight atomic bullets, the UC workers have created synthetic elements from No. 93 to No. 101.

With the heavier particles from the HILAC, they hope to produce element No. 102 and possibly still heavier atoms.

Key roles in the development and use of the HILAC were credited yesterday to Chester Van Atta, Edward Hubbard, Albert Ghiorso, Stanley Thompson, Fred Voelker, Warren Dexter and Larry Brown of the UC staff.

The HILAC at Berkeley was designed in co-operation with other scientists and engineers at Yale University. A second HILAC is now nearing completion at Yale.

Both instruments — costing about \$1.7 million apiece—were financed by Atomic Energy Commission.



The 10-foot-diameter barrel of the giant atom-smashing cannon dwarfs a man standing in it (arrow). The device is 112 feet long.

SECOND STAGE

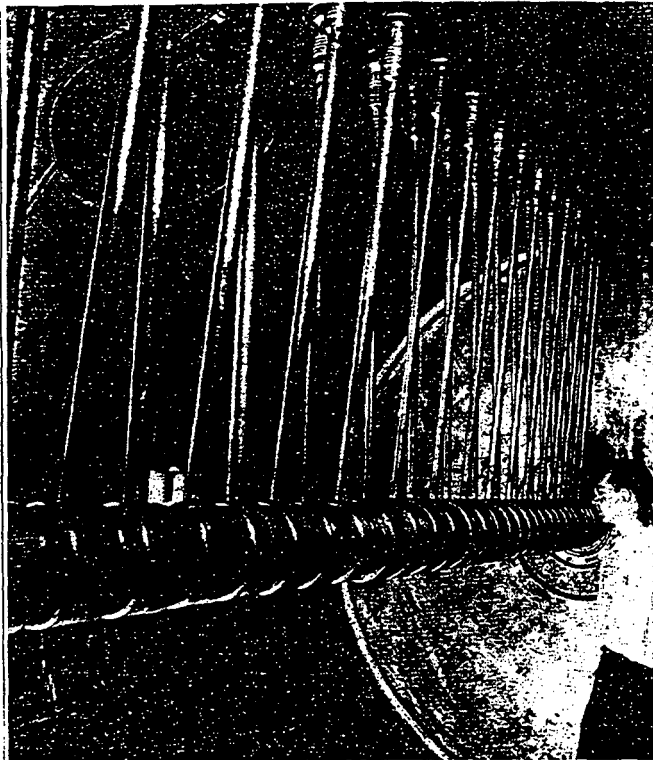
The particles then go into a second component, called the pre-stripper. In this portion of the machine, the particles are accelerated each time they pass through each of 37 "drift tubes." The projectiles achieve 1,000,000 volts per particle (nucleon)—or 14,000,000 electron volts in the case of nitrogen 14.

The particles emerge into the third component of the machine, called the stripper. This is essentially a cloud of mercury atoms (vaporized mercury), about 1/100th the thickness of a piece of paper. The mercury atoms tear off two of the remaining four electrons on the projectile.

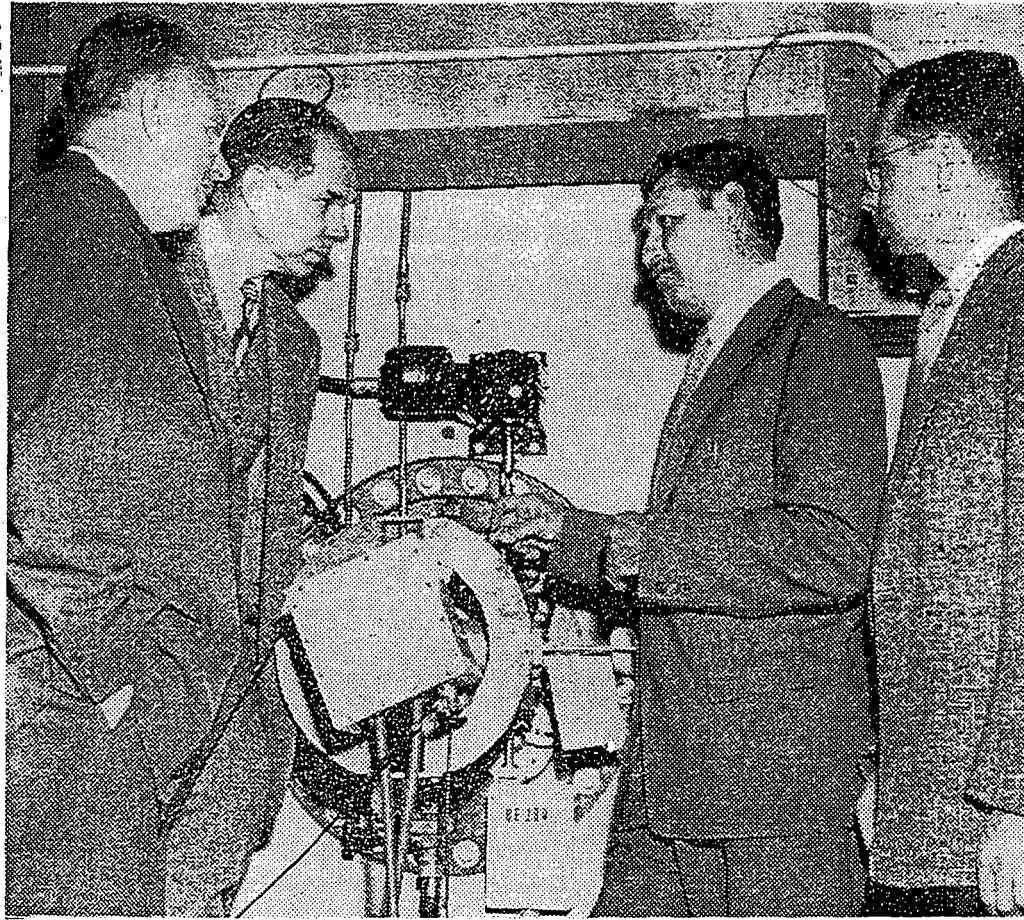
The fourth component is a big tank 90 feet long and 10 feet in diameter. This "post-stripper" contains 68 more drift tubes through which the particles are accelerated to their ultimate energy of 10,000,000 electron volts per nucleon. Inside each is a strong focusing quadropole magnet, which is a new development in accelerator design.

The machine fires projectiles in pulses. At the present time it fires two pulses per second, and ultimately the number will be 20 per second. At the present time each pulse contains about 100,000,000,000 particles; when the machine is further developed the number will be 100 times as many per pulse.

Information on ultra-heavy elements is important both in chemistry and for a better formulation of nuclear theory.



Dr. Edward Hubbard, who supervised the construction of the new atom smasher on the UC campus, stands in the interior of the machine. Atomic Energy Commission funds were used for the \$1,700,000 project.



TARGET—Dr. Ernest O. Lawrence, Dr. Glenn Seaborg, Dr. Albert Ghiorso and Dr. Edward Hubbard (from left) of the U.C. Radiation Laboratory inspect target for nuclear shots from "Hilac," the university's newest atom smasher. (Story, Page 16.)

Los Angeles Examiner
Wed., April 24, 1957 11 Sec.

U. C. Gets New Super A-Smasher

*Seek to Produce 6
Chemical Elements*

BERKELEY, April 23—(AP)—A machine to produce super-heavyweight atoms and to dig still deeper into the secrets of matter was added today to the research armament of nuclear science.

The machine will fire atomic bullets far heavier than any

atom-smashing machine heretofore built. This heavy nuclear artillery will be turned against the uranium atom and other elements to produce new basic substances.

It was built by the Atomic Energy Commission for the University of California's radiation laboratory. It is called a heavy ion linear accelerator (HILAC). It cost 1¼ million dollars.

NEW ELEMENTS—

With this and other machines now under construction scientists hope to produce about six new chemical elements, said Dr. Glenn T. Seaborg, Nobel Prize winner and a leader in nuclear research.

Atom smashers previously built have produced nine elements heavier than uranium, heaviest of the conventional 92 elements.

They were produced by using very light atomic bullets such as the cores of hydrogen and helium atoms.

The HILAC will use the cores of much heavier atoms such as carbon and on up to argon, respectively 12 and 40 times as heavy as hydrogen.

When a carbon or argon nucleus strikes and sticks to a uranium atom the result will be something new in man-made particles.

HILAC should also produce variations of conventional elements lighter than uranium, Dr. Seaborg said, which may be of value in medicine and biology.

New Atom Smasher At Work

By TOM RILEY

BERKELEY, April 24— University of California scientists are today probing deep into the secrets of the atom with a new "heavy artillery" atom-smasher known as the Hilac.

The latest addition to the family of atom-smashers housed in the university's Radiation Laboratory was unveiled to the public yesterday by Dr. Ernest O. Lawrence, Nobel-prize winning director of the research center, and his staff.

The 112-foot machine, designed to hurl heavy "ions," or

Picture on Page 17

nuclear particles, with energies of up to 140,000,000 volts, may enable scientists to produce elements up to 107 in the Periodic Table, said Dr. Glenn Seaborg, also a Nobel Laureate and associate director of the radiation laboratory. The heaviest element so far produced is mendelevium, which is No. 101 on the table.

IMPORTANT ROLE

But, more important, added Dr. Seaborg, is the deeper understanding of the nature of matter that the Hilac offers to science.

While the university's giant Bevatron can fire atomic bullets with energies of up to 6.2 billion volts, it is confined to very light weight particles such as protons, or the nuclei of hydrogen atoms.

The Hilac, which derives its name from "Heavy Ion Linear Accelerator," will blast the heavy cores of atoms such as carbon, nitrogen and argon into a target of uranium atoms. Carbon atoms are 12 times heavier than hydrogen. Argon is 40 times heavier.

The object of some phases of the new research program, explained Dr. Seaborg, will be to get the nucleus of a carbon or argon atom to stick to a uranium atom. Such an accomplishment, he said, would result in something new in manmade atomic particles.

Dr. Lawrence said the Hilac had been in operation only an hour when it produced its first scientific surprise, a process which he described as "sort of a reverse fission."

PROCESS STUDIED

The new process is still being studied, Dr. Lawrence explained, but enough about it is known to excite worldwide scientific interest.

Dr. Seaborg added that the new "fission process" would not have any usefulness as a power producer.

Another interesting sidelight of the new machine, which is a twin to one being completed at University, is contemplated studies of the effects of the heavy particles on living cells.

The particles generated in the Hilac are similar to cosmic radiations that are believed to exist outside of the earth's atmosphere.

The Hilac, and the Yale University linear accelerator, have been built by the Atomic Energy Commission at a cost of \$1,700,000 each.

Disney Show on Atom To Be Repeated Tonight

Oakland Tribune 4/24/57 By JAMES ABBE

Where were you on the night of Jan. 23, 1957?

If you were watching Walt Disney's "Our Friend the Atom" that night you'll need no urging to see it again; if you were not, then tune in KGO-TV at 8 tonight.

This is one repeat program about which the advance blurb probably doesn't exaggerate when it reads "In response to unprecedented nationwide acclaim by viewers, critics and educators, Walt Disney will again present 'Our Friend the Atom.'"

Among the educators who endorsed Disney's "Atom" was U.C.'s Dr. Glenn Seaborg, Nobel Prize winner who produced and presented a series on the atom on KQED which was distributed nationwide via educational TV stations. Dr. Seaborg said of Disney's atom: "I can attest to its scientific accuracy. The program was extraordinarily well done, combining instruction and entertainment very ably."

the heaviest atom known was uranium, No. 92 in the list of elements.

Since then, Seaborg and others have smashed away with nuclear bullets to create heavier and heavier synthetic elements, all the way up to No. 101.

NEW ELEMENTS.

With his new cannon, Seaborg thinks he can go still higher, merging his bombarding atomic particles into still heavier chunks of matter that really should not exist on earth.

The distinction is this: earlier atom smashers and the atom bomb are concerned with fission, the splitting up of atomic hearts into smaller particles; in the bomb this releases sudden and immense energy; in machines like the cyclotron it means that the broken pieces reform in different ways, become radioactive, decay and die.

NUCLEAR FUSION.

Fusion is the forcing together of nuclear particles, under the force of tremendous heat in a hydrogen bomb or in the sun.

While HILAC is non-explosive and promises nothing in the way of a weapon or the harnessing of fusion for power, it does in a small way fit

the fusion pattern by building up heavy particles into still heavier units—man-made elements.

Besides such alchemy, the machine is to be used to study the effect of atomic bombardment on viruses, yeast cells and other living matter.

Its direct line bombardment—compared with the circular path of bullets in the cyclotron type of atom smasher—and the fact that its beam of bullets can be focused down to a fifth of an inch across make it ideal for such work.

In design, the new Berkeley machine really looks like a cannon, lying flat on the ground.

POWER SOURCE.

A power source at the breech end of the cannon accelerates the atomic bullets with an original surge of power, and they are boosted along their way by a series of 37 doughnut-like "draft tubes" wrapped around the barrel and containing electric impulses.

Already he has proof that his search will not be hopeless, for HILAC has been secretly operating off and on since the night of April 11.

Within a couple of hours after the first shot was fired, Seaborg said, "We found something new."

The first bullets were atoms of the relatively heavy element nitrogen and the target was a thin sheet of uranium, the heaviest of all the natural elements.

SURPRISE RESULT.

Out of the terrific collision of the two types of atoms came a type of thorium—which was expected—and the nucleus of a type of oxygen, an atom heavier than the original projectile—a result which was not expected.

While this may not sound exciting to an atomically illiterate layman, it is vastly so to the Berkeley physicists.

This first result, said Seaborg, is a kind of "reverse fission," which would make it a sort of fusion.

This so-called pre-stripper section of the barrel, strips away some of the electrons which circle the nucleus of the atom bullet. Still more are lopped off in the stripper section, a shield of vaporized mercury 1/1,000 the thickness of thin paper.

The last of the electron stripping—which cleans the bullet down to its essential nucleus, without electrons—occurs in the last long, 90 feet of the barrel, where 68 more of the "draft tubes" speed the bullets up to 10,000,000 electron volts per nuclear particle.

The machine, financed by the Atomic Energy Commission, cost \$1,700,000. A twin at Yale is nearing completion.

S.F. News 4/30/55

UC Researchers Find Synthetic Element

UC researchers reported today the discovery of yet another "synthetic" element, high in the atomic weight scale and, like its fellows, intensely radioactive.

The discovery was reported simultaneously by Albert Ghiorso, to the American Physical Society meeting in Washington, D. C., and by S. G. Thompson, at a Nobel Physics Institute meeting at Stockholm, Sweden.

Others on the research team were Glenn T. Seaborg, Nobel prize winner; Bernard Harvey and G. R. Choppin, both research chemists, as are Ghiorso and Thompson.

The new element, numbered 101, has been named Mendelevium, in honor of Dmitri Mendeleev, 19th century Russian chemist who devised the periodic table to classify elements and to predict the behavior of elements that were unknown in his day.

Isolating Mendelevium was a tricky business. It was done by using the university's 60-inch cyclotron to bombard another synthetic element, No. 99, with alpha particles—the nuclei of helium atoms.

It took about one billion atoms of No. 99 to produce 17 atoms of Mendelevium, a quantity too small to be seen or weighed.

The new element has a half-life, or rate of decay into lighter, commoner elements, measured in hours. So, for that matter, has No. 99, which was why the experiment was difficult, necessarily hasty, and productive of such a small quantity of Mendelevium.

The new element has no known practical application, either as an atomic explosive, either as power source.

This is true of all the other artificial elements produced by Seaborg and fellow researchers at Berkeley since 1940—except plutonium, warhead of the first A-bomb—but the research is not time wasted.

The artificial elements are valuable to basic research in the structure and behavior of the atom.



FUTURE SCIENTISTS—Five top-winners of National Science Fair awards yesterday are, from left, Dorothy Lundquist, 17, Webster, S.D.; Richard Henry Conrad,

16, New Brunswick, N.J.; James Barclay Compton, 17, Bethesda, Md.; Kristina Toffer, 18, Allentown, Pa., and Johanna Elizabeth Phay, 17, Oxford, Miss.

Times photo

Teen-agers Given Tips on Careers as Scientists

Today's teen-ager who wants to be tomorrow's Nobel prize winner was given some advice here yesterday from an expert.

The advice was: learn Russian; become a mathematician; forget the 35-hour workweek, and delay deciding on your specialty until about midway through college.

The adviser was Dr. Glenn T. Seaborg, who, he admitted, fell in love with science while a teen-ager here in David Starr Jordan High School. Today he is a Nobel prize winner and director of nuclear chemistry, radiation laboratory, University of California at Berkeley.

He gave his advice to this year's promising crop of future American scientists, the 233 teen-agers who attended

the eighth annual National Science Fair awards luncheon, held in Rodger Young Auditorium. They were here from 40 States and Alaska and represented hundreds of thousands of students in the competition.

The five top youths all were from the East, South and Midwest.

The five were Dorothy Lundquist of Webster, S.D., and Kristina Toffer, 18, of Allentown, Pa., who tied for first in the girls' biological sciences division; Johanna Elizabeth Phay, 17, Oxford, Miss.; Richard Henry Conrad, 16, New Brunswick, N.J., and James Barclay Compton, 17, of Bethesda, Md.

Dr. Seaborg paid tribute to Russian progress in the sci-

ences by telling the youngsters:

"German and French, in that order, are the standard choices for science majors. For persons in your generation, however, I would advise that serious consideration be given to the Russian language, which, next to English, will be the most important language of science in the next 50 years."

Need of Mathematics

On mathematics: "It is difficult to overestimate the importance of mathematics" in preparing for the sciences.

On the 35-hour work week idea: "I cannot feel that the 35-hour week has much relevance for a creative scientist. Most (scientific) discoveries represent a lot of perseverance and perspiration . . . Many of our most successful scientists owe their great success not so much to superior brains as to their capacity for sustained work."

On choosing a specialized

field of science: "Do not undertake your training on too narrow a basis . . . As your education advances, your insights and conceptions of science will greatly increase, and you will find your own talents and revised interests taking you into fields you are not now considering."

Prizes Awarded

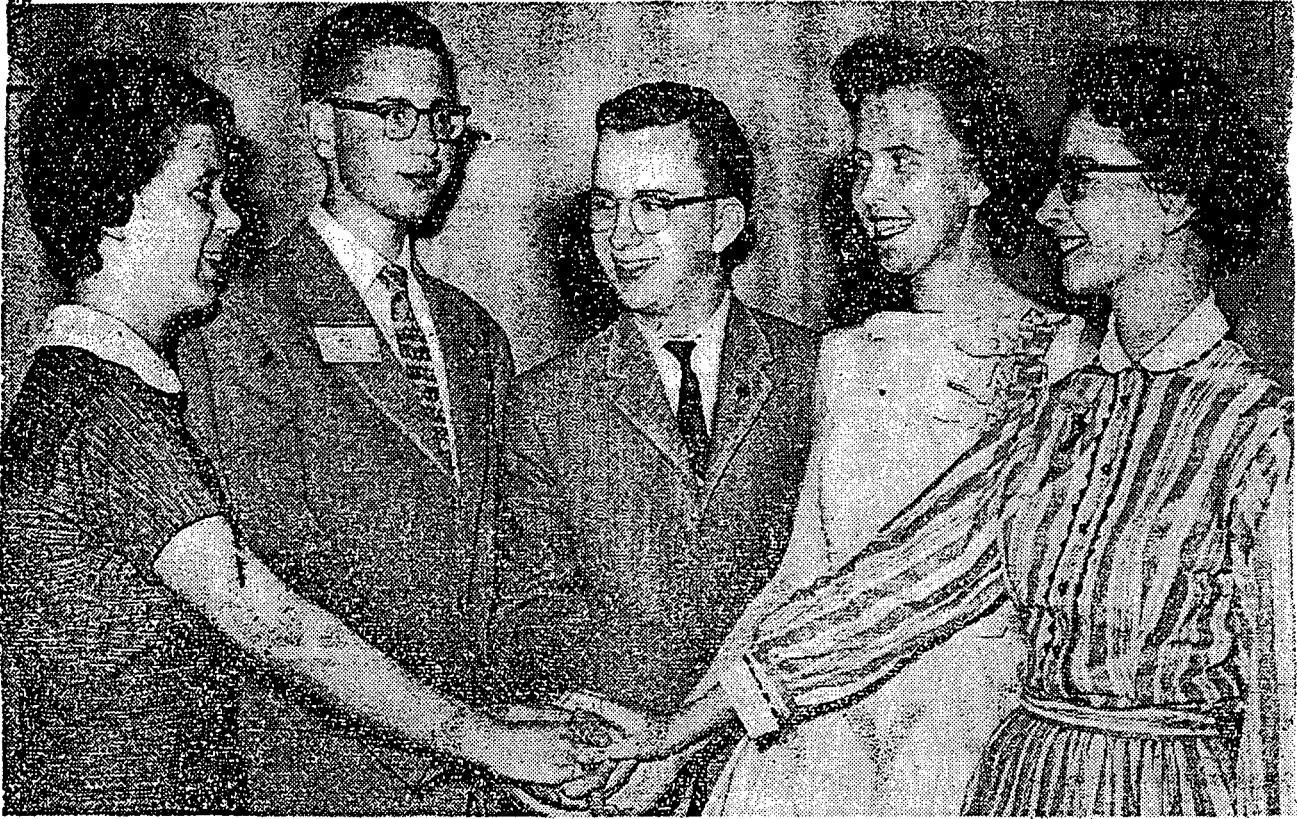
A total of \$2500 in prizes was given winners in the form of scientific equipment known as "wish" awards, with \$125 going to each of the first-place winners, and lesser prizes, down to \$25 worth each to the fourth place winners.

Four Southland youngsters were among the 50 in fourth place. They were Noel MacFarland, 19, University High School; Thomas Dale Kennelly, 18, Pacific Senior High School, San Bernardino; Katherine Lois Schmelter, 16, Colton Union High School; and Camille Cecile Miller, San Dieguito High School, Encinitas.

5 Top Winners at Science Fair

L. A. Examiner

5/12/57



—Los Angeles Examiner photo.

THE GIRLS OUT-SCIENCED THE FELLOWS, BUT THERE'S OBVIOUSLY NO ILL FEELING

Happy victors (from left) Dorothy Lundquist, Richard Conrad, James Compton, Kristina Toffer, Johanna Phay.

Three girls and two boys were named yesterday as top winners in the eighth annual National Science Fair which closed at the Los Angeles County Museum.

Winners were named at an awards luncheon at Rodger Young Auditorium and attended by 233 finalists from 40 states, Alaska and Washington, D. C.

Top exhibitors were Dorothy Lundquist, 17, Webster, S. D.; Kristina Toffer, 18, Allentown, Pa.; Johanna Elizabeth Phay, 17, Oxford, Miss.; Richard H. Conrad, 16, Rutgers Preparatory School, New Brunswick, N. J.; and James B. Compton, 17, Bethesda, Md.

SALT IN PLANTS—
Miss Toffer and Miss Lundquist tied in the biological sciences and Miss Phay won the girls' division in physical science.

Miss Toffer, with an exhibit of a study of salt in plants, followed in the footsteps of her sister, Taimi, who won similar honors at last year's fair.

Miss Lundquist's exhibit was a study of the effects of inadequate sleep upon physical and mental alertness. She also received a special American Medical Association citation.

Miss Phay's exhibit was a display showing commercial uses for the Osage orange seed.

Conrad took top honors with a study of an organism called euglena. And Compton won with an electrical comparison of a chemical cell and a living cell.

Each received certificates for \$125 worth of equipment of their choice. A number of second, third and fourth place winners were given certificates worth \$75, \$50 and \$25.

The show concluded with an address by Dr. Glenn T. Seaborg, Nobel prize winner and professor of chemistry at the University of California at Berkeley.

A. H. Batchelder, vice president, California Research Corporation, and Dr. Howard L. Bevis, National Committee for the Development of Scientists and Engineers, also spoke.

Watson Davis, director of Science Service, was master of ceremonies.

Oregonian 5/23/57
**Trojans, Vandals Fined \$1000
For Athletic Code Violations**

SPOKANE (AP) — Southern California and the University of Idaho were fined \$1000 each Wednesday for violations of the Pacific Coast conference athletic code.

No other schools in the nine-member conference were fined.

Dr. Glenn Seaborg of California, conference spokesman, said the conference had changed its fining system so that penalties were assessed only for "substantial violations."

Misdeds considered of a minor nature are merely referred back to the individual institutions for corrective action.

Seaborg said there were "some" of these but did not elaborate.

Southern California was penalized for "statements by a basketball coach during and after a conference basketball game during the past season."

Idaho was nicked for "illegal interviews of prospective students by a track coach."

In each case, the conference spokesman declined to identify the erring coach. He said the statements in the Southern California case were made to game officials and the conference had

acted after studying the officials' report.

Seaborg also declined to list the athletes involved at Idaho or say how many were in the group.

Joe Glander is head track coach at Idaho and Forrest Two-good is top man in basketball

at Southern California but the violations were not tied to these head coaches or their assistants by name.

Conference commissioner Victor O. Schmidt commended all nine member schools on their "degree of compliance" with the athletic code.



En högtidlighet

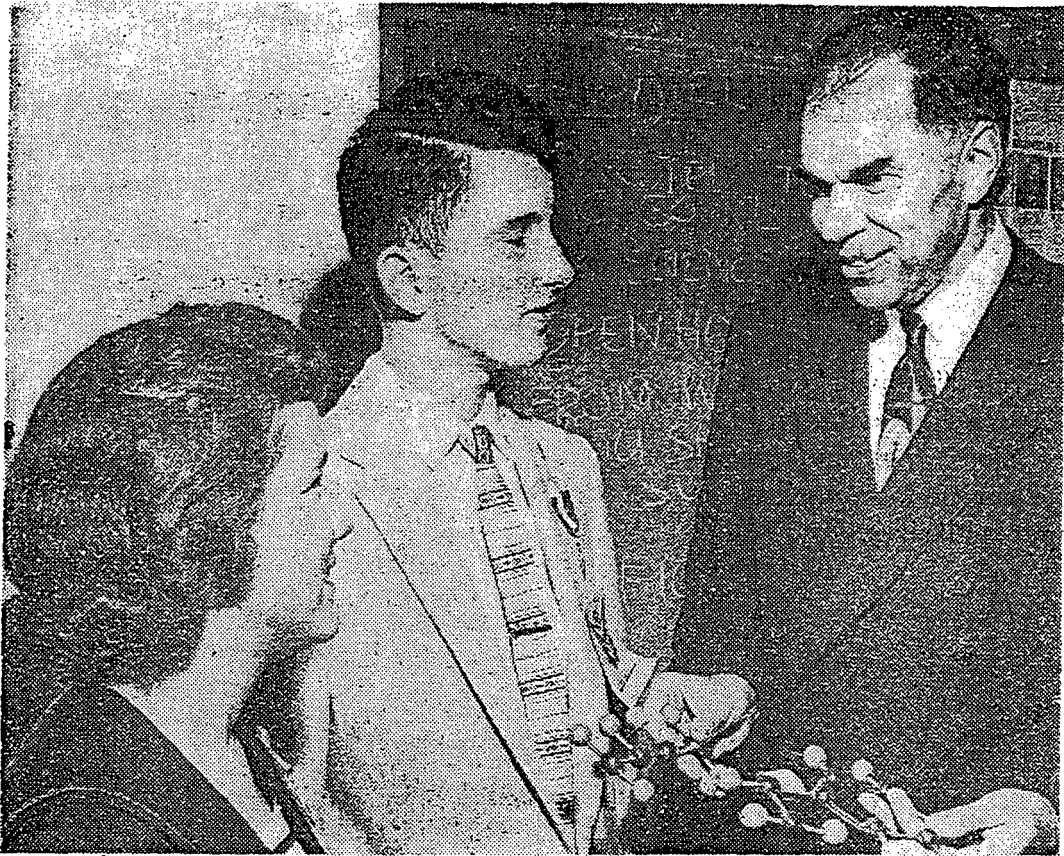
ägde i lördags rum i Svärdsjö kyrka, då ett 20-tal ungdomar som under sommaren undervisats av komminister G. Hillebrant konfirmerades.

Svärdsjö hade ett celebret besök

i lördags då nobelpristagaren i fysik Glenn T. Seaborg från USA gjorde en kort visit. Anledningen var att han ville se den trakt där hans farfars bror, framlidne folkskolläraren G. D. Sjöberg, verkat. Han besökte Geijersgården, där Sjöberg bodde efter det han pensionerats, och en svägerska till Sjöberg, fru Ellen Geijer, berättade om hans farfars bror. Han besökte även Sjöbergs grav på Svärdsjö kyrkogård samt Källängets skola, där Sjöberg utförde sin lärargärning under senare hälften av 1800-talet och något in på 1900-talet. På skolgården fick han beundra den bronsbild, utförd av konstnären Arvid Backlund, som tacksamma skolbarn hedrat sin avhållne lärares minne med.

Professor Seaborgs farfar var värlmlänning och utvandrade i unga år till Amerika medan brodern gick lärarbanan och hamnade i Svärdsjö.

Students Chat With Famous Scientist



Nuclear know-how from one who knows how is what Patty Pence and Terry Patton got this week from Nobel prize-winning chemist Glenn Seaborg. The scientist met with the Science club at Lewis and Clark

high school during a visit to Spokane. Miss Pence is the daughter of Mr. and Mrs. C. O. Pence, E9204 Grace; Patton is the son of Mrs. Pauline Patton, N1311 Marguerite. The chat was a thrill for students.

*A*s NOBEL PRIZE winner Glenn T. Seaborg of the University of California tells it, Robert Oppenheimer was awakened late one night while he headed the Los Alamos laboratories by a transatlantic phone call from Potsdam, where Truman was conferring with Churchill and Stalin about ways to end the war with Japan. The untried atom bomb was still pretty much of an unknown force at that time among military men and politicians.

Said a harried voice at the other end of the line: "What about the overpressure? Won't the bomb blow the plane that drops it out of the air?"

"I don't know," Oppenheimer replied. "That's the sort of thing you'd better ask General Hap Arnold."

"And who the hell do you think this is talking?" came the indignant response from across the ocean. *Reader's Digest - 6/57 - Chemical and Engineering News*

AMERIKANSK NOBELPRISTAGARE gästar sin kusin i Eskilstuna

På onsdagsmorgonen fick kontorist Gösta Adolfsson på Gredbergsgatan 5 B i Eskilstuna riktigt slorfrämmande. Den amerikanske professorn och nobelpristagaren i kemi Glenn T. Seaborg kom nämligen och hälsade på. Det blev ett hjärtligt möte mellan de båda vid centralstationen. Professor Seaborg och hr Adolfsson är kusiner och det är första gången den amerikanska gästen besöker Eskilstuna.

Det blev köttbullar till frukost för USA-professorn i Eskilstuna



Frukostdags i Gredbergsgatan 5 B två trappor. Runt bordet ses fr. v. Gösta Adolfsson, prof. Seaborgs mor Selma, Irene Adolfsson som serverar prof. Seaborg bröd samt Jenny och Karl Adolfsson.

Det vankades skinka och köttbullar vid onsdagsfrukosten hemma hos familjen Gösta Adolfsson, Gredbergsgatan 5 B i Eskilstuna. Det var dukat för sex i finrummet. Hedersgäst var atomprofessorn Glenn T. Seaborg och hans mor Selma från Kalifornien. Vidare var där hr Adolfssons mamma Jenny och pappa Karl från Kopparberg och så var det det wiga värdfolket självt, Irene och Gösta.

Det är en ståtlig man prof. Seaborg. Det fattas inte många centimeter för att längden skulle vara två meter. Han är älskvärd och

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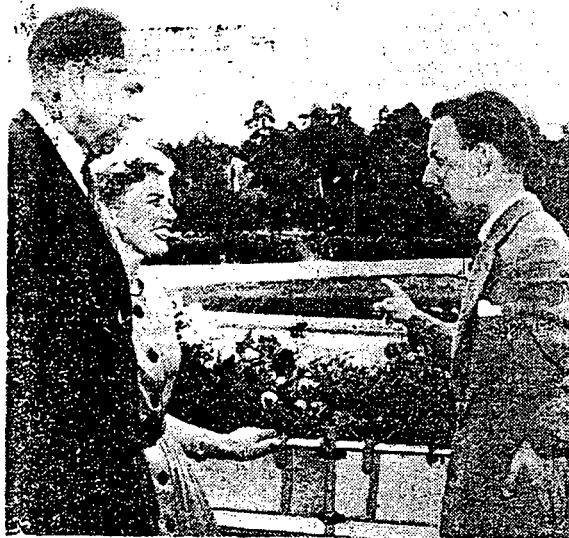
kilstuna har han dock aldrig varit fört.

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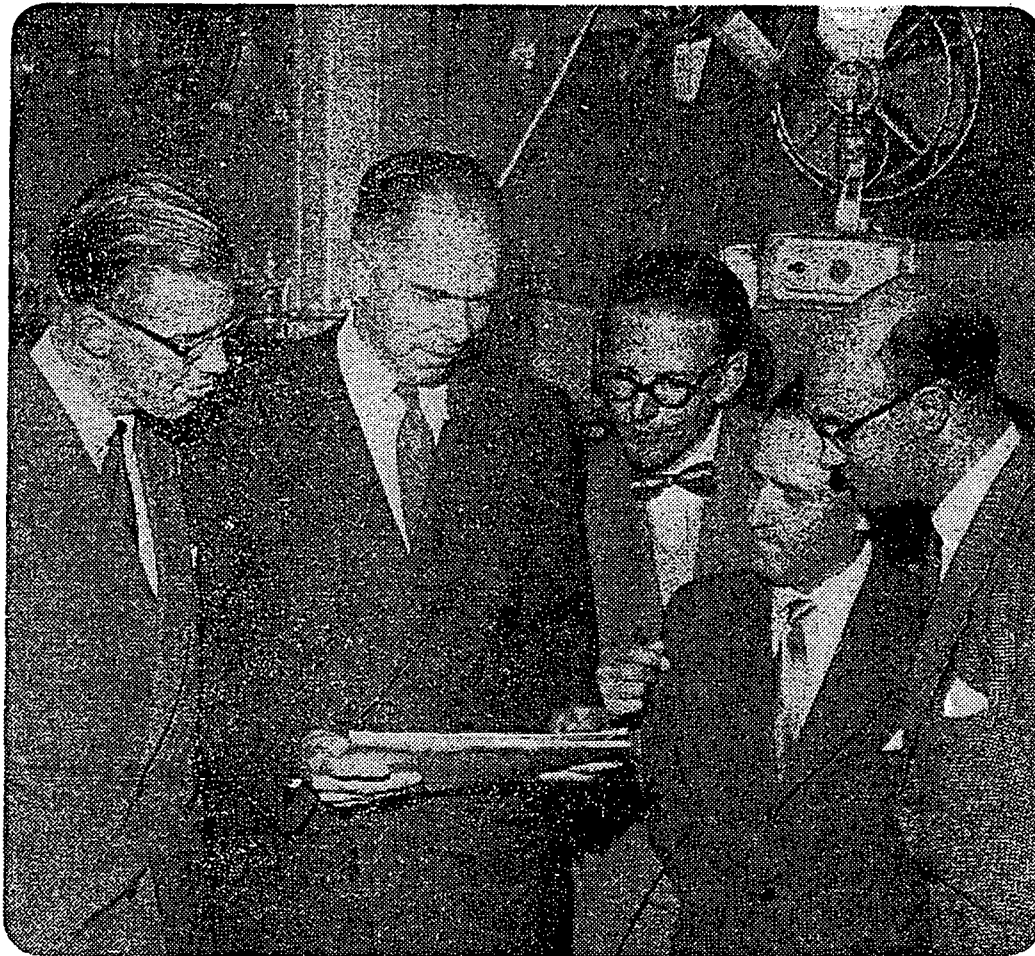
De amerikanska gästerna, som inte har något speciellt program uppgjort för sitt eskilstunabesök annat än att umgås med släktingarna, tyckte det var lite kyligt i luften i smedstaden. När de for från Los Angeles var det 35 grader varmt där. En viss skillnad alltså.



Värdfolket har tagit prof. Seaborg med sig ut på balkongen för att visa honom den fina utsikten.

Dagens-Nyheter 7/10/57

Nya grundämnet 102 funnet i Stockholm



"Fint arbete" sade svensk-amerikanske professorn, nestorn bland producenterna av konstgjorda grundämnen, Glenn T Seaborg (andre man från vänster) när han på tisdagen besåg cyklotronarbetet som lett till grundämne 102, vilket aldrig förr tillverkats. Samlade kring honom ses de fyra svenskarna i laget, t v tekn lic Lennart W Holm och från höger fil lic Wilhelm Forsling, fil lic Hugo Atterling och fil dr Björn Aström.

Et nytt grundämne har tillverkats i Stockholm. Det är första gången något sådant sker i form av ett internationellt lagarbete. Elementet har nummer 102. Det är en metall som närmast tillhör de sk aktiniderna och kemiskt påminner om de sällsynta jordartsmetaller vilka för cirka hundra år sedan påträffades i Ytterby gruva i Stockholms skärgård.

Upptäckarna har funnit att hälften av atomerna som de fått fram med denna första variant av grundämne 102 faller sönder radioaktivt på omkring 10 minuter. De ämnar föreslå internationella kemiunionen att ämnet kallas "nobelium" efter Nobelinstitutet.

Det är en svensk-engelsk-amerikansk åtta-man-grupp, varav fyra svenskar, som hittills lyckats producera sammanlagt något hund-

ratat atomer av det nya ämnet. Det har skett i Wallenbergsstiftelsens cyklotronlaboratorium vid Nobelinstitutet för fysik i Frescati, som leds av professor Manne Siegbahn. I varje enskilt experiment har de aldrig kunnat påvisa mer än fem atomer av ämnet, och sammanlagt har de mätt omkring 25 stycken.

NYTT GRUNDÄMNE UPPTÄCKT HÄR



Fem forskare diskuterar den stora upptäckten, fr.v. tekn.lic. Lennart W. Holm, den amerikanske professorn och nobelpristagaren Glenn Seaborg, fil.dr Björn Aström, fil.lic. Hugo Atterling och fil.lic. Wilhelm Forsling. Samtliga fyra svenskar tillhör den internationella forskargruppen, professor Seaborg var gäst vid Nobelinstitutet. Bilden togs vid den stora cyklotronen.

Internationell grupp utför forskarbragd

— Av OVE ERIKSSON —

Ett nytt grundämne har framställts vid Nobelinstitutet för fysik vid Frescati i Stockholm. Grundämnet betecknas ännu så länge endast med sitt nummer i grundämnenas periodiska system: 102, men upptäckarna — ett forskarlag från Sverige, England och USA — skall föreslå internationella kemionomen (IUPAC) att ge det namnet Nobelium. Det högtintressanta forskningsresultatet tillkännagavs på tisdagen samtidigt i Sverige, Amerika och England — på Nobelinstitutet var det gruppens svenska medlemmar som redogjorde för upptäckten.

Den internationella forskargruppen har bestått av fil. lic. Hugo Atterling, fil. lic. Wilhelm Forsling, tekn. lic. Lennart W. Holm och fil. dr Björn Åström från Nobelinstitutet i Stockholm, dr Paul R. Fields och dr Arnold M. Friedman från Argonne-laboratoriet i Chicago samt dr John Milsted och mr Alan B. Beadle från Harwell-laboratoriet i England.

Det nya grundämnet har framställts i Wallenbergsstiftelsens cyklotronlaboratorium vid Nobelinstitutet. I den stora cyklotronen har man bestrålat det redan förefintliga grundämnet 96, curium, med koljoner, dvs. laddade kolatomer i gasform, under utomordentligt hög hastighet — ungefär en sjundedel av ljudets hastighet. Därvid har kolatomens 6 laddningar överförts till curiumkärnans 96, varvid det nya grundämnets 102-laddade atomkärna uppkommit.

Första gången man lyckades observera och isolera grundämne 102 var den 23 mars i år, och senare försök har konfirmerat detta resultat. Det har emellertid aldrig vid något försök gått att framställa flera påvisbara atomer av element 102 än 5 stycken — som jämförelse kan nämnas att en droppe vatten innehåller ca tretusen trilioner (3×10^{21}) atomer.

En så ringa mängd som fem atomer är givetvis fullständigt osynlig, den kan inte heller vägas eller observeras genom andra tekniska metoder. Element 102 avslöjar dock sin närvaro genom att den liksom övriga tunga element utsänder radioaktiv strålning, mätbar med speciella instrument.

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AMERIKANSK NOBELPRISTAGARE gästar sin kusin i Eskilstuna

Folket 7/10/57

På onsdagsmorgonen fick kontorist Gösta Adolfsson på Gredbergsgatan 5 B i Eskilstuna riktigt storfrämmande. Den amerikanske professorn och nobelpristagaren i kemi Glenn T. Seaborg kom nämligen och hälsade på. Det blev ett hjärtligt möte mellan de båda vid centralstationen. Professor Seaborg och hr Adolfsson är kusiner och det är första gången den amerikanska gästen besöker Eskilstuna.

Professor Seaborg fick sitt nobelpris 1951 och då besökte han Sverige. Han hade dock inte möjlighet att komma till Eskilstuna vid det tillfället, men avlade i stället en visit hos hr Adolfssons föräldrar i Kopparberg. Släktförhållandet mellan dagens gäst och värd kan uttryckas utförligare på det viset att professor Seaborg är hr Adolfssons fars systers son.

Professor Seaborg i född i Amerika — han är nu 45 år gammal — men hans mor såg dagens ljus i Sverige. Hon flyttade för övrigt till USA när hon var 17 år. Professorn är gift med en amerikanska.

Han har vid Berkleyuniversitetet i Kalifornien lett arbetet med att framställa åtta av de från och med nu tio konstgjorda grundämnena eller som de också kallas transuranerna.

Professor Seaborg fortsätter på onsdagskvällen sin resa till Kopparberg, där han gästar hr Adolfssons föräldrar. I nästa vecka far han till Paris för att delta i den stora internationella kemikonferensen där.



Glenn Seaborg

Fläskläpp pris
på ridderlighet

Världsberömd kemist-Nobel-pristagare på snabbbesök hos släktingar i Eskilstuna

Vem visste att en av världens absolut främsta atomforskare och 1951 års nobelpristagare i kemi, professor Glenn Seaborg från Berkeleyuniversitetet i Californien har en kusin i Eskilstuna — kontorist Gösta Adolfsson, Gredbergsgatan 5 b — och att det var den världsberömde svenskamerikanen som tyst och försynt steg av stockholmståget 10.00 på onsdagsförmiddagen på Eskilstuna Central för att tillsammans med sina svenska släktingar njuta av smörgåsbordet i den trevliga våningen i Gredbyområdet.



— GRATULERAR till världens största atomer, sade professor Glenn Seaborg från USA när han på onsdagen kom till Eskilstuna för att träffa sin kusin. På bilden ses den prominente "atomgästen" i mitten omgiven av fr. v. Jenny Adolfsson och modern Selma, som följt med från Amerika. Stående bakom är fr. v. Selmas bror Karl samt Irene och Gösta Adolfsson — den senare Glenns kusin, numera bosatt i Eskilstuna.

Seaborg tog del av Nobelium, besöker släkten i Kopparberg

Representanter för nationell och internationell press hade på tisdagen samlats vid Nobelinstitutet i Stockholm för att ta del av det senaste kemiska forskningsresultatet av världsklass, upptäckten av det nya grundämnet 102. På tillfällig visit i Stockholm är professor Glenn T. Seaborg vilken av en händelse var på besök på Nobelinstitutet vid presskonferensen.

(Forts. på sista sid.)



Nobelpristagaren
Glenn T. Seaborg

— Jag reste till Europa och kemikonferensen i Paris för att tala om 99, 100 och 101 — men nu får jag också passa på att tala om 102 — dessa atomer de största på jorden, ja kanske i hela universum och har nyligen "kläckte" i gamla Sweden, säger professor Seaborg leende.

Eftersom det finns 92 grundämnen i naturen och "93:an och 94:an" framställdes i USA i samband med arbetet med atombomben har man under professor Seaborgs ledning vid Berkeleyuniversitetet successivt lyckats fortsätta serien och bygga upp grundämnen nr 95, 96, 97, 98, 99, 100 och 101.

Nobelium är namnet på det nya "svenska" grundämne — nr 102 — som man lyckats framställa vid Wallenbergsstiftelsens cyklotronlaboratorium vid Nobelinstitutet för fysik i Stockholm. Framställningen skedde genom bestrålning av element 96, curium, med koljoner i institutets stora cyklotron. Radioaktiva atomer, som preliminärt tillskrevs element 102 observerades och isolerades för första gången den 23 mars i år.

— Nyckeln till den var cyklotronen i Stockholm. Curium finns på många ställen, men detta är det enda laboratorium, som har koljoner av rätta slaget, framhåller professor Seaborg för Eskilstuna-Kurirens medarbetare. På en fråga om hur många grundämnen, som kan tänkas bli framställda med konst, svarar han att elementen upp till 104 och 105 kan vara möjliga att identifiera kemiskt.

— Sedan får man ta till konstgrepp som i dag inte kallas för kemiska metoder, säger professorn och berättar att i september räknar man med att ha en fantastisk apparatur klar i Berkeley, som väntas ge ännu större möjligheter än cyklotronen i Frascati.

— Det torde dock dröja ett år innan vi är klara.

Till dess finns världens största atomer i Stockholm — gratulerar, säger mr Seaborg, som tror på det fredliga samarbetet med atomkraften och pekar på att det internationella samarbetet med kemi-konferenser vartannat år löpt relativt friktionsfritt och gett stort utbyte.

Nobelium är nu också det första artificiella grundämne, som upptäckts i landet.

EN VATTENDROPPE!

Som jämförelse kan nämnas att en droppe vatten innehåller cirka trefusen trillioner atomer, en så ringa mängd är givetvis fullständigt osynlig och kan ej heller vägas eller dylikt. Element nr 102 avslöjar dock sin närvaro genom att det liksom övriga tunga element utsänder radioaktiv strålning, som kan mätas med speciella instrument.

Det var stora släktkramen på Gredbergsgatan i Eskilstuna. Med på resan till Europa har mr Seaborg sin mor — Selma — som också fick tillfälle att hälsa på sin bror Karl, som är Gösta Adolfssons far. Gösta Adolfsson har bara bott i Eskilstuna några år — annars är släktrotterna fast

förankrade i Bergslagen, dit professor Seaborg tillsammans med sin mor hoppas kunna resa under onsdagen.

— Var har professorn lärt sig att tala så god svenska

— Ohh-ye — min mor har lärt mig det och jag tycker det är roligt att tala svenska!

— Första gången jag var i Sverige var 1949, då jag föreläste på Vetenskapsakademien, och andra gången var 1951, då jag fick Nobelpriset. Då bodde alla släktingarna i Bergslagen. Det är första gången jag gästar Eskilstuna — men så fort jag kommer till Europa igen skall jag försöka hinna med att träffa alla släktingarna igen, och då givetvis också komma till Eskilstuna. Jag måste ju få tillfälle att tala svenska riktigt!

Sade den restige amerikanen och försvann ut på balkongen för att njuta av utsikten över Gredbyområdet och koppla av från stundande konferenser och upptäckter av nya grundämnen.

Bewe.

”Världsmästaren i grundämnen” belåten med nya ”konkurrenter”

I Sverige har vi inga sådana kärnreaktorer. Man har därför måst slå in på en annan väg än Gud och amerikanerna. Med hjälp av tyngre partiklar än neutroner har man försökt ta hela trappan i ett enda kliv. Sådana tyngre partiklar är exempelvis kärnor eller s. k. joner av kol, kväve, syre eller ädelgasen neon.

För att sådana joner skall få en så hög energi att de reagerar med t. ex. uran, måste de ges mycket höga hastigheter, t. ex. en sjundedel av ljushastigheten, som är ungefär 300 000 kilometer i sekunden. Sådant går för sig i Nobelinstitutets cyklotron.

Redan i början av 1954 kunde den svenska forskargruppen visa detta. Då bombarderade man uran med syrejoner och fick grundämnet 100, som senare döpts till fermium efter Nobelpristagaren i fysik 1938 Enrico Fermi, en av nyckelmännen bakom atombomben. En annan isotop, d. v. s. variation av samma ämne men med något annorlunda vikt, hade strax tidigare framställts vid Berkeleyuniversitetet i Kalifornien, världens främsta ”grundämnestestad”. Där hade man emellertid gått ”den gamla vänliga vägen” med neutronbeskjutning. I stället för uran hade man använt plutonium.

URANET ”FÖR LÄTT”

Ända tills rätt nyligen var uran det tyngsta grundämne som fanns tillgängligt i Sverige i så stora mängder att det kunde användas som ”råämne” i en cyklotron. Uran har atomvikten 92, och för att kunna få ett grundämne med större vikt än 100 måste man ha en tyngre kärna än syrets med vikten åtta som bombarderande partikel. Man försökte med neon som väger 10. I princip skulle man på så sätt ha fått just grundämnet 102. Det fick man emellertid inte när man försökte. Det gällde alltså att få tag i ett tyngre ”målämne” än uran.

Det var nu det svensk-amerikanskt-brittiska samarbetet kom till stånd. I USA hade man genom att bombardera plutonium med neutroner fått fram några tiotal milligram av grundämnet 96, curium — ett namn som härletts av det ingalunda obekanta forskarnamnet Curie. När man nu fick tillgång till detta ämne borde ett bombardemang med kolkärnor med vikten sex kunna ge grundämnet 102. Nobelinstitutets cyklotron är den enda accelerator i världen just nu som kan leverera en tillräckligt stark ström av kolkärnor med en energi som är lämplig i just detta sammanhang.

Det var som sagt den 23 mars som man fick bekräftelse på sina

beräkningar. Det visade sig emellertid att det var precis nätt och jämnt som framställningen av grundämnet 102 var möjlig. Inte någon enstaka gång har man sålunda lyckats påvisa mer än fem atomer av detta ämne. Som jämförelse kan nämnas att det finns ungefär tre tusen triljoner atomer i en droppe vatten. (I kilopriskräknat torde grundämnet 102 alltså vara ett av de dyraste ämnen som funnits.)

Så små mängder av ett ämne syns naturligtvis inte heller kan man väga dem. Grundämnet 102 sänder emellertid liksom alla de andra tunga grundämnena ut radioaktiv strålning. Den kan identifieras — och därmed grundämnet.

INGEN PRAKTISK ANVÄNDNING

Men i och med denna strålning faller ämnet sönder. Det upphör så småningom att vara grundämnet 102. I det här fallet har man bara hälften kvar efter ungefär 10 minuter. Efter en timme finns det praktiskt taget ingenting kvar. Grundämnet 102 kommer därför aldrig att kunna framställas i några större mängder. Det kommer heller aldrig att kunna få någon praktisk användning.

Men för de grundforskande vetenskapsmännen ligger det annorlunda till. Trots den knäppt tillmätta tid de har att arbeta med när det gäller grundämnet 102 hinner de kemiskt identifiera det och — särskilt under själva sönderfallsprocessen — skaffa sig insyn i materialets struktur. Det är där betydelsen av grundämnet 102 ligger.

”VÄRLDSMÄSTARVISIT”

Det var en stolt kvartett svenska forskare som berättade om sina rön på Nobelinstitutet på tisdagseftermiddagen. Stoltheten berodde inte bara på de resultat man nått utan också på att man utan föregående varning fått det finaste besök som väl tänkas kan just i detta sammanhang. Lång och gänglig, svarthårig med silverstänk hade en av nobelpristagarna i kemi 1951 svenskättlingen Glenn T. Seaborg, ”grundämnenas världsmästare”, infunnit sig just lagom till presentationen av det ”nya” grundämnet.

Dr Seaborg, som är här tillsammans med sin mor för att besöka sina släktingar under några dagar och som väl förstår men inte så gärna talar svenska, sade att han var förtjust över underrättelserna från forskargruppen. Grundämnet 102 är det första ”konstgjorda” grundämnet som inte framställts vid Berkeleyuniversitetet, som dock står med så förkrossande siffror som nio grundämnen av 10 möjliga. Av dessa har

dr Seaborg varit med om att framställa åtta. Och lika belåten verkade han vara med det faktum att ”värste konkurrenten” i USA — Argonne-laboratoriet — fått vara med den här gången.

103, 104, 105, 10?

— Hur lång kan grundämnesserien egentligen bli, tillfrågades han.

— Jag kan tänka mig att nummer 103 och 104 och möjligen 105 skall kunna identifieras på kemisk väg, svarade han. Kemisk identifikation är ännu så länge ett absolut krav i detta sammanhang. Vill man fortsätta bortom 104 eller 105, får man nog tillgripa en del tricks och överge det kemiska identifikationskravet.

Själv tror jag inte att man kan komma längre än så. Det finns emellertid de som anser, att man kanske skall kunna finna stabila och alltså praktiskt användbara grundämnen längre bort. Jag tror inte på det, men naturligtvis hoppas jag att de kommer att få rätt.

NOBELIUM NAMNET?

Den svenska forskargruppen uttalar sig inte gärna enskilt utan talar helst en för alla, alla för en. För Svenska Dagbladets medarbetare berättade de att grundämnet 102 med all sannolikhet förekommit ”naturligt” under någon del av den process som vi i dagligt tal kallar skapelsen. I samband med de höga temperaturer som förekom innan jorden så småningom började kallna på allvar har förmodligen alla de tunga grundämnena bildats stegvis — på amerikanskt sätt, alltså — för att dock efter längre eller kortare tid försvinnat försvinna igen. Det är möjligt att det tidvis bildats så pass stora mängder av dessa ämnen att sönderfallet åtminstone till stor del upphävts av nybildningen. Så småningom har dock sönderfallet med den fallande temperaturen tagit överhanden. Man tror sig för övrigt ha fått bekräftelse på detta genom att iaktta händelserna på vissa stjärnor.

Till sist återstår endast att rapportera att grundämnet 102 förmodligen kommer att döpas till nobelium. I varje fall tycks man på amerikansk sida vilja föreslå det.

Kars.

Forskarbragd i Stockholm Grundämnet 102 isolerat

O.K. 10/7 1957
Ett nytt grundämne, nr 102, har framställts i Wallenbergstiftel-
sens cyklotronlaboratorium vid Nobelinstitutet för fysik i Stock-
holm. Upptäckarna har enats om att hos Internationella kemi-
unionen föreslå namnet nebelium på det nya ämnet. Det är en
internationell forskargrupp som lyckats producera ett antal ato-
mer, vilka tillskrives det tidigare ej kända grundämnet 102.

Framställningen skedde genom
bestrålning av element 96, Curium
med kol-joner i institutets stora
cyklotron. Radioaktiva atomer av
det nya grundämnet observerades
och isolerades första gången den
23 mars i år och senare arbete har
bekräftat resultatet. De i grup-
pen ingående forskarna är Hugo
Atterling, Wilhem Forsling, Len-
nart W. Holm och Björn Aström.
Sverige, Paul R. Fields och Arnold
M. Friedman, USA, samt John
Milsted och Alan E. Beadie, Eng-
land.

En av 1951 års nobelpristagare i
kemi, professor Glenn Seaborg
från Berkeley, där alla s. k. trans-
uraner utom nr 102 upptäcktes var
med vid en presskonferens, där
det nya grundämnet presentera-
des. — Ett fint arbete, sade han.
Nyckeln till det var cyklotronen
i Stockholm. Cerium finns på må-
nga ställen men detta är det enda
laboratorium som har kol-joner
av rätta slaget. På en fråga hur
många grundämnen som kan tän-
kas bli framställda med konst sva-
rade professor Seaborg att ele-
menten upp till 104 och 105 kan
vara möjliga att identifiera kem-
iskt. Sedan får man ta till konst-
grepp som i dag inte kan kallas
för kemiska metoder, sade han.

Det tyngsta grundämnet som
finns i naturen är uran, vilket har
nummer 92. De tyngre grundäm-
nena sönderfaller så fort att de
för länge sedan försvunnit. Med
de senaste Arens kärnfysikaliska
och kärnkemiska metoder har det
lyckats att framställa tio sådana
ämnen, "transuraner", nämligen
93 neptunium, 94 plutonium, 95
americium, 96 curium, 97 berke-
lium, 98 californium, 99 einstein-
ium, 100 fermium, 101 mendelev-
ium och nu senast 102, som torde
få namnet nebelium.

• Plutonium och berke-lium

Seaborgs namn har lysat klart
på den amerikanska forskarhim-
len i snart tjugo år. Som ung
kemiföreläsare år 1940 fick han
chansen att fortsätta de experi-
ment med Berkeleycyklotronen
som hans något äldre kollega
Edwin McMillan redan inlett. Ex-
perimenten ledde till upptäckten
av det konstgjorda grundämnet
plutonium och senare till den
klyvbara isotopen av plutonium,
som kom att få utomordentlig
betydelse som atombränsle. Vid
Seaborgs laboratorium har sedan
dess upptäckts en hel rad isoto-
per av konstgjorda radioaktiva
grundämnen, av vilka ett par fått
namn som tydligt anger ur-
sprungot: berke-lium (nr 97) och
californium (nr 98).

Med undantag för krigsåren
1942—45 har Seaborg under hela
sin karriär varit knuten till Cali-
fornien-universitetet i Berkeley.
Vid sidan av posten som kansler
leder han nu den kärnkemiska
forskningen och är en av de an-
svariga för universitetets berömda
strålningslaboratorium.

Seaborgs kunnande har tagits
i anspråk av flera federala or-
gan som planerar och samordnar
atomenergiforskningen. Han till-
hörde i fyra år atomenergikom-



Dr Glenn Seaborg — vällkänd i Kopparberg och Grängesberg.

världens största atomer upptäckta i Stockholm

Av K. A. LARSSON

92 grundämnen finns i naturen. Elementen nr 93 och 94, Neptunium och Plutonium, framställdes i Amerika i samband med arbetet på atombomben. Sedan har man vid Berkeley-universitetet under ledning av nobelpristagaren Glenn Seaborg lyckats fortsätta serien och successivt byggt upp grundämnena nr 95, 96, 97, 98, 99, 100 och 101. På tisdagen meddelades, att ett internationellt forskarlag vid nobelinstitutet för fysik i Frascati lyckats producera enstaka atomer av element nr 102, som på amerikanskt förslag troligen får namnet Nobelium. Dessa atomer är de största på jorden, ja kanske i hela universum.

— Jag gratulerar till ett förnämligt forskningsarbete, sade svenskättlingen prof. Seaborg, som av en tillfällighet kom till Stockholm samma dag.

Det nya grundämnet är en metall och mycket nära besläktat med sina närmaste föregångare i det periodiska systemet. Någon praktisk betydelse kommer det säkerligen aldrig att få, då det har en livstid, som räknas i minuter. Liksom de flesta av de tunga elementen sönderfaller det nämligen spontant, det är m. a. o. radioaktivt.

Nyckeln till upptäckten är den stora cyklotronen, som kommit till med stöd av Wallenbergiska stiftelsen. Det är den näst största "osynkroniserade" cyklotronen i världen och den enda, som kan ge en stark partikelström av relativt tunga joner med konstant energi.

Denna egenskap har de svenska forskarna tidigare utnyttjat i syfte att framställa element nr 100 genom beskjutning av uran med syrejoner. Då uran innehåller 92 protoner och syre 8, borde det gå att slå ihop kärnorna och på så

Nobelpristagare från USA mötte släkt i Eskilstuna

Svenska-Dagbladet 7/11/57



Nobelpristagaren, professor Glenn Seaborg i mitten, nedre raden, omgiven av fru Jenny Adolfsson (l. v.) och modern, Selma, som fått följa med från USA. Stående fr. v.: Moderns bror Karl samt Irene och Gösta Adolfsson, den sistnämnde professor Seaborgs kusin.

ESKILSTUNA. (SvD:s korr.) Sin mest prominenta hedersgäst hittills hade makarna Gösta och Irene Adolfsson, Gröndbergsgatan 5 B i Eskilstuna vid onsdagslunchens skinka och köttbullar. Det var atomprofessorn och Nobelpristagaren Glenn T. Seaborg från Berkeleyuniversitetet i Kalifornien, som på sin resa till den internationella kemikonferensen i Paris nästa vecka passat på att göra en avstickare till Sverige, dels för att bevitna presentationen av det nya grundämnet 102 och dels för att hälsa på släkten.

Tyst och försynt steg han med mamma Selma, som fått följa med från USA, av Stockholmståget kl. 10 på förmiddagen och stegade direkt in i stora släktens öppna famn. Där var kusin Gösta med fru Irene, förstås, och vidare fru Selmas bror Karl Adolfsson från Kopparberg och hans fru Jenny, som var nere för att möta den världsberömda anförvanten. Kl. 17.24, för att vara exakt, lämnade gästerna smedstaden med tåget till Kopparberg, där professor Seaborg och hans mor skall bo några dagar hos Karl och Jenny Adolfsson.

Några nämnvärda svårigheter att göra sig förstadd bland sina svenska släktingar hade inte den älskvarde professorn. Oh no, min mor har lärt mig svenska, och trots att jag bott i Amerika i hela mitt liv hänger

jag med ganska fint i de språkliga svängarna, säger han. Första gången jag var i Sverige var 1949, då jag föreläste på Vetenskapsakademien och andra gången var 1951, då jag fick Nobelpriset, men Eskilstuna har jag aldrig tidigare besökt.

På söndag eller måndag reser professor Seaborg vidare med flyg till Paris, där han skall delta i en stor internationell kemikonferens. Han skall föreläsa om grundämnena 99, 100 och 101, som man under hans ledning lyckats bygga upp vid Berkeleyuniversitetet.

— Jag får nog lov att lägga in några ord om 102 också, som man ju nyligen framställt på Wallenbergstiftelsens cyklotronlaboratorium här i Sverige — ett mycket fint arbete förresten.

Nobelpristagare
fick fin nyhet

Svenska Dagbladet
Ny metall framställd ^{7/10/57}
i Stockholmscyklotron



Nobelpristagaren Glenn T. Seaborg lyssnar begrundande på de fyra svenska forskarnas redogörelse för framställningen av grundämnet 102. I förgrunden fil. lic. Hugo Atterling, i bakgrunden tekn. lic. Lennart Holm, prof. Seaborg, fil. dr Björn Åström och fil. lic. Wilhelm Forsling.

Glenn Seaborg som fick 1951 års Nobelpris i kemi berättade vid en intervju för Bergslagsposten att han under sitt besök i Sverige den här gången kommer att besöka en del släkt. Det blir främst Kopparberg som prof. Seaborg kommer att hälsa på. Hans farföräldrar utvandrade till Amerika någon gång på 1800-talet och han är alltså i rakt nedstigande led bördig från Sverige.

Efter att ha konfererat med kollegorna på Nobelinstitutet under tisdagen reste prof. Seaborg och hans mor till Eskilstuna och släkt där och därifrån går färden på onsdagskvällen till Kopparberg där morbror Karl Adolfsson får besök. I Kopparberg stannar han till söndag då han reser till en internationell konfe-

rens i Paris. Efter den konferensen återvänder prof. Seaborg till Kopparberg för några dagar och sedan går färden tillbaka till USA. Under besöket i Stockholm har morbrodern Karl Adolfsson varit med. Bergslagen och Kopparberg är inga okända begrepp för prof. Seaborg vilken besökt dessa platser tidigare. Prof. Seaborg förstår svenska bra men talar språket sämre.

Ett nytt grundämne, nr 102, har framställts i Wallenbergsstiftelsens cirklotronlaboratorium vid Nobelinstitutet för fysik i Stockholm av en internationell forskargrupp. De har lyckats producera ett antal atomer, vilka tillskrivs det tidigare ej kända grundämnet 102 och framställningen skedde genom bestrålning av element 96, curium, med koljoner i institutets stora cyklotron. Radioaktiva atomer, som preliminärt tillskrevs element 102, observerades och isolerades för första gången i mars i år och senare arbete har bekräftat resultatet. Upptäckarna har enats om att föreslå namnet Nobelium på det nya grundämnet. Det kan inte framställas i några större mängder och följaktligen inte heller få någon praktisk användning.

Internationellt lag gjorde 100 atomer

Den 23 mars i år inträffade en märklig händelse i den stora cyklotronen, hos Nobelinstitutet för fysik vid Frescati i Stockholm. En metall, som inte funnits i denna del av världsalltet sedan "begynnelsen, då Gud skapade himmel och jord", hade återuppstått under händerna på ett internationellt forskarlag. Därmed var listan över kända kemiska grundämnen uppe i nr 102.

Det var fyra svenskar, två amerikaner och en britt som bevitnade skapelseprocessen — i den mån man kan tala om åsyna vittnen i ett kärnfysikaliskt sammanhang som detta. Svenskarna var fil. lic. Hugo Atterling, som är chef för cyklotronen, fil. lic. Wilhelm Forsling, tekn. lic. W. Holm och fil. dr Björn Åström, amerikanerna doktorerna Paul R. Fields och Arnold M. Friedman från det berömda Argonnelaboratoriet i Chicago och britten dr John Milsted från det inte mindre berömda Harwell — den brittiska atomforskningsstationen.

Dessa sju forskare hade samarbetat någon tid med siktet direkt inställt just på grundämnet 102. Mr Alan B. Beadle, också han från

Harwell, hade senare sällat sig till gruppen.

Studier av de mycket tunga grundämnena, de s. k. transuranerna, som alltså är tyngre än detta det tyngsta grundämne som finns i naturen i dag, har pågått vid Nobelinstitutet sedan 1953, och man har provat diverse olika vägar för framställning.

Särskilt i USA och Kanada, där man haft tillgång till kärnreaktorer med mycket höga neutronflöden, har man steg för steg kunnat bygga upp sådana ämnen. Man har, liksom Gud Fader en gång gjorde, låtit neutroner fångas in av uran. Ju fler neutroner som fångats in, desto tyngre har det grundämne man fått blivit.

Forts. sista, sp. 3, GRUNDÄMNE

sätt få en ny kärna med 100 protoner.

Seaborg kom före

Försöket lyckades också, men innan resultatet bekräftats, kom meddelandet att nobelpristagaren Seaborg hunnit före. Han hade använt sin beprövade metod att successivt skjuta in neutroner i tunga kärnor. Med denna metod lyckades han även framställa element nr 101. Sedan var det stopp, och han fick ge upp försöket att framställa 102-an med denna metod.

Under tiden hade forskarna vid Frascati sökt framställa element nr 102 genom att slå ihop uran och neon. Försöken misslyckades dock. Stöten blev så hård, att kärnorna gick sönder.

På ömse sidor Atlanten mognade nu uppfattningen, att bästa chansen att lyckas borde vara att beskjuta element nr 96, curium, med koljoner, som är lättare än neon. Svenskarna hade apparaterna här för men inte något curium. Amerikanerna hade lyckats få fram en mikroskopisk mängd curium men hade ingen lämplig apparat.

Kontakt med USA

Allt var sålunda väl upplagt för ett internationellt samarbete, och genom en engelsman, dr Milsted vid Harwell, knöts kontakten mellan institutet vid Frascati och det berömda Argonne-laboratoriet i Chicago. På nyåret började vissa förberedande arbeten, och i mars var man klar att försöka på allvar. Alla de i arbetet deltagande forskarna samlades nu i Stockholm, och den 23 mars kunde man inregistrera det första positiva resultatet.

Gruppen bestod av fil. lic. Hugo Atterling; fil. lic. Wilhelm Forsling, tekn. lic. Lennart W. Holm och fil. dr Björn Aström från Stockholm, dr Paul R. Fields och dr Arnold M. Friedman från Chicago samt dr John Milsted och mr Alan B. Beadle från Harwell i England.

Identifieringen av det nya grundämnet var en mycket svår uppgift. Sedan den lilla curiummängden bestrålats fick den gå igenom en kemisk separation och därefter mätte man energin på de alfastrålar, som det nya elementet sänder ut vid sitt sönderfall.

Högst 5 atomer

För att vara säker har man gjort ett dussintal bestrålningsförsök och anser sig nu kunna fastslå existensen av det nya grundämnet. Det största antal atomer, man kunnat påvisa vid en och samma bestrålning är dock endast fem. Då man vet att en vattendroppe innehåller minst 1.000.000.000.000.000.000.000 atomer, är det lätt att förstå, vilken ytterligt förfinad teknik, som måste tillgripas vid försök av detta slag.

Hur långt kan man hoppas att fortsätta framställningen av allt tyngre element? frågar vi prof. Seaborg:

— De nya elementen blir allt mer kortlivade, och därför kan vi inte hoppas att med kemiska metoder fastställa existensen av nya grundämnen längre än till nr 104 eller 105. Med vissa konstgrepp kanske man kan komma ytterligare något steg.

— Det är förstås inte uteslutet, att det vid något visst nummer blir ett hopp i elementens livslängd, och då kommer frågan i ett helt annat läge. Jag tror dock inte på detta.

Hoppet att hitta ett mera stabilt tyngre element hänger samman med det faktum, att man ännu inte har någon pålitlig teori för atomkärnans byggnad. Atomens byggnad i stort är bättre

känd, och därför kan man förutse, vilka egenskaper nyupptäckta element bör ha.

Nr 104 av ny typ

Från uran och uppåt är alla elementen ganska lika, eftersom de nytillkommande elektronerna hamnar i ett inre skal, och det är de yttre elektronskalerna, som bestämmer ämnets kemiska egenskaper. Även element 103 kommer att bli likartat, men nr 104 blir ett ämne av annan typ, och det är inte helt uteslutet, att dess kärna visar sig mera stabil.

Om det skall lyckas för forskarna vid Frascati att producera även element nr 103 och 104 är mycket tvivelaktigt. Framställningen av nr 102 synes ligga just inom gränsen för cyklotronens möjligheter.

40.000 km/sek.

Vad som händer i apparaten är, att atomkärnor eller laddade atomer accelereras upp till en hastighet av över 40.000 km/sek., en sjundedel av ljushastigheten, varvid de får en energi av 90 miljoner elektronvolt. Accelerationen sker mellan två poler, som kastas om i snabb takt samtidigt som partiklarnas bana kröks i spiral av en magnet på 450 ton.

— Nu inriktar vi oss närmast på semester, säger licentiat Atterling. Cyklotronen skall under tiden förses med en deflektor, så att vi kan dra ut partikelstrålen, vilket ger oss bättre arbetsmöjligheter.

I Berkeley byggs emellertid just nu en apparatur, som väntas ge ännu större möjligheter än cyklotronen i Frascati. Det torde dock dröja ett år, innan amerikanerna är redo att sätta i gång. Till dess finns världens största atomer i Stockholm.

K. A. Larsson

Hem till släkten säger Seaborg

— Jag kom hit för att hälsa på mina släktingar i Kopparberg, säger prof. Glenn Seaborg, som alltjämt förstår svenska men föredrar att tala engelska. I morgon bitti reser jag till Eskilstuna för att träffa en kusin och så fortsätter vi till min farbror i Kopparberg. På måndag flyger jag till en kongress i Paris.

Gammal svensk specialitet

Nobelium är det första artificiellt framställda grundämne, som upptäckts i Sverige. Av de naturliga grundämnena har dock ett stort antal hittats i vårt land. Världens rikaste fyndort för nya grundämnen har varit Ytterby församling i stockholmstrakten, vilket av speglas i flera namn på sällsynta ämnen, såsom Ytterbium, Yttrium, Terbium, Erbium, Holmium och Tulium har givetvis också svenskt påbrå.

De konstgjorda grundämnena

- 93 Neptunium
- 94 Plutonium
- 95 Americium
- 96 Curium
- 97 Berkelium
- 98 Californium
- 99 Einsteinium
- 100 Fermium
- 101 Mendelevium
- 102 Nobelium

Glenn Seaborg i Kopparberg: 'Ni har kalifornisk vinter'

— Jag hette Selma Eriksson, när jag reste ut 1904, berättar fru Seaborg. I USA träffade jag sedan min blivande make, vars far, som alltså hette Sjöberg, var bördig från Hällefors och utvandrade 1867. Denne Sjöberg hade flera syskon, som reste över till USA. En enda stannade hemma i Sverige och det var Daniel Sjöberg, som blev skollärare i Svärdsjö.

— Jag vet att det finns en byst av honom på en skolgård i Svärdsjö och i morgon skall vi resa dit hela släkten och titta på farfars bror, säger professor Glenn, som känner förvånansvärt väl till alla sina svenska släktförvecklingar och även kommenterar dem på trivsamt och änknappligt svenska.

— Och hur ser nu de närmaste dagarnas program ut?

— Söndag tåg till Stockholm, måndag flyg till Paris och konferensföreläsningar. Den 24 kommer jag tillbaka till Stockholm, reser direkt till Kopparberg och hoppas hinna besöka Hällefors innan hemfärden till USA. anträdde den 29 juli.

En världsmästare i grundämnen, går av allt att döma till grunden även med sådana detaljer, som att lägga upp effektivt reseprogram under en snabbvisit i sina faders hembygd.

Axet.



Glenn Seaborg och modern tittar på familjebilder hemma hos Karl Adolfsson med maka i Herrhagen och diskuterar förstas dagens program. Det är många som skall besökas under den korta tiden här.

— Ni har en sommar som påminner om vår kaliforniska vinter, säger nobelpristagaren Glenn Seaborg och får instämmande av sin 70-åriga moder Selma, som den här gången följer sonen på resan till Europa och Sverige och framför allt då Kopparberg och Grängesberg.

Seaborgs kom i onsdags kväll till Kopparberg och professorn själv stannar denna vecka för att sedan göra en avstickare till

Paris där han skall hålla föreläsningar. Han kommer tillbaka till Sverige den 25 igen för några dagars visit. Mamma Selma stannar däremot hela tiden hos sin bror Karl Adolfsson i Herrhagen, Kopparberg, och gör därifrån avstickare till sitt födelsesamhälle Grängesberg.

Seaborg, som sist var i Sverige 1951 då han hämtade sitt Nobelpris, är lika förtjust som då att få komma hit. Nu går det ju så

fort också med den nya flyglinjen över Nordpolen. Bara 22 timmar från Los Angeles till Sverige och kära släkten säger den sympatiska svenskättlingen

Seaborg Outlines Nuclear Future

The age of nuclear energy for peacetime uses is fast approaching but it is too soon to be able to say when it will be able to compete economically with other forms of energy.

This view was expressed by Dr. Glenn T. Seaborg, professor of chemistry at the University of California and a Nobel Prize winner, in a recent talk before the Commonwealth Club in San Francisco.

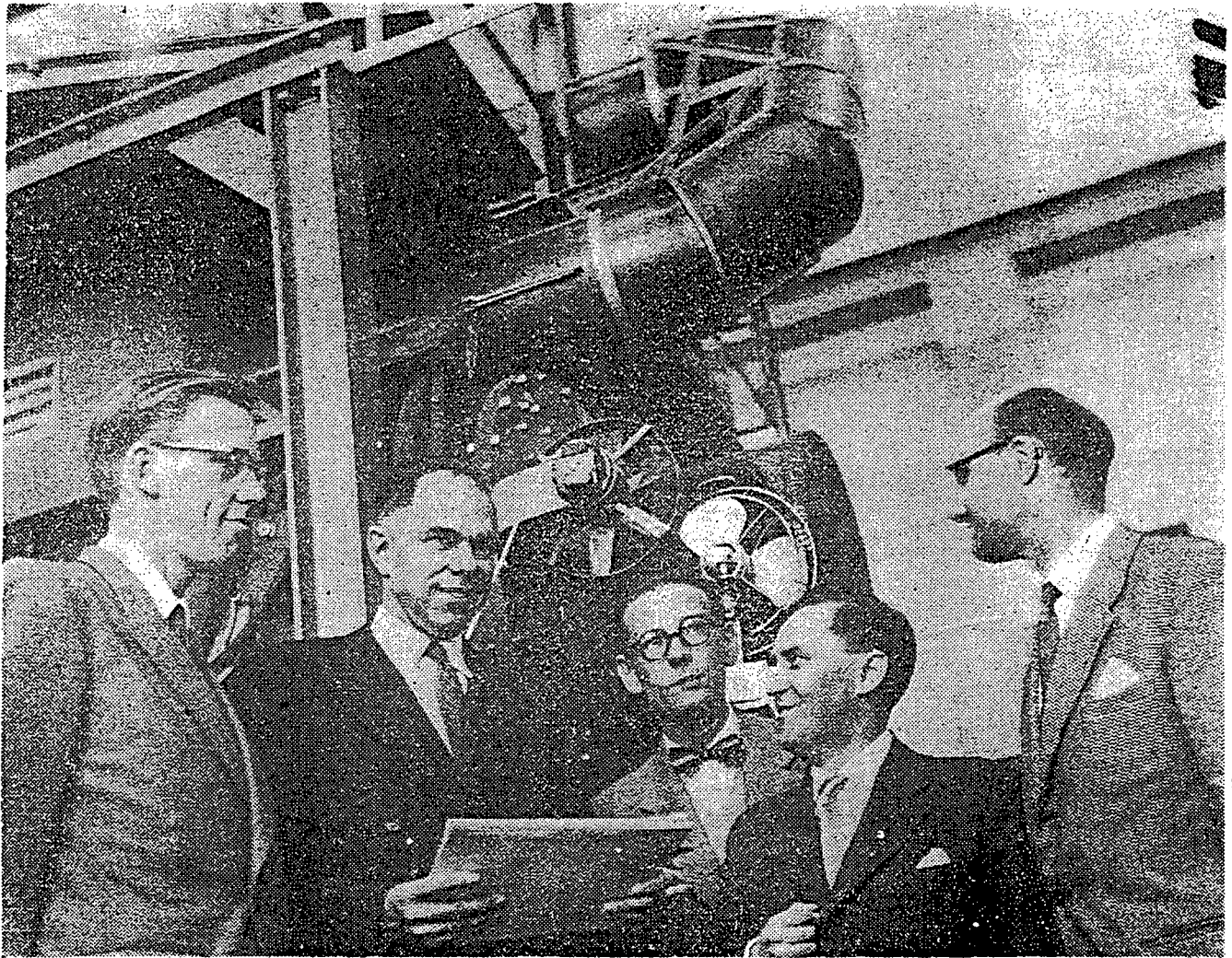
He said that conventional sources of power such as coal, gas, oil and wood will be inadequate by 1980, ac-

ording to the best estimates. Nuclear power will be the obvious answer to the shortage.

Doctor Seaborg said that a pound of uranium as it is currently used is equivalent in heat energy to about 10,000,000 kilowatt hours of electricity or to the energy obtained by burning about 1,500 tons of coal.

He believes that it will never be possible to use atomic reactors for running ordinary automobiles because of the weight of material used to shield the devices. But he said it would be possible to use them for propulsion of ships or large airplanes.

FORSKARGRUPP MED SVENSKAR UPPTÄCKTE NYTT GRUNDÄMNE



Vid den stora cyklotronen på Nobelinstitutet diskuteras det aktuella forskningsresultatet här av (fr. v.) tekn. lic. Lennart W. Holm, nobelpristagaren professor Glen T. Seaborg, USA, fil. dr. Björn Åström, fil. lic. Hugo Atterling och fil. lic. Wilhelm Forsling.

FYRA SVENSKAR utgör hälften av en internationell forskargrupp som vid Nobelinstitutet i fysik i Stockholm har lyckats framställa ett tidigare okänt grundämne, 102. Framställningen skedde genom bestrålning av element 96, curium, med koljoner i institutets stora cyklotron. Radioaktiva atomer som preliminärt tillskrevs element 102 observerades och isolerades för första gången den 23 mars i år. Senare arbete har bekräftat resultatet. De amerikanska forskare som är med i gruppen uppges föreslå att element 102 skall kallas Nobelium.

De forskare som deltagit i arbetet är svenskarna fil. lic. Hugo Atterling och fil. lic. Wilhelm Forsling, tekn. lic. Lennart W. Holm och fil. dr. Björn Åström, alla från Wallenbergstiftelsens cyklotronlaboratorium i Frascati. Övriga i gruppen är dr. Paul R. Fields och dr. Arnold M. Friedman från Argonne-laboratoriet i Chicago, USA, samt dr. John Milsted och mr. Alan B. Beadle från Harwell-laboratoriet i England.

Halveringstiden (d. v. s. den tid efter vilken endast hälften av den ursprungliga mängden återstår) för element 102 är endast omkring 10 minuter. Det innebär att inom mindre än en timme efter sin tillkomst är grundämnet åter praktiskt taget försvunnet.

I och med utsändandet av denna strålning sönderfaller dock grundämnet. Halveringstiden för det nu framställda grundämne 102 är endast omkring 10 minuter, dvs. efter denna tid återstår bara hälften av den ursprungliga mängden. Efter mindre än en timme är grundämnet åter praktiskt taget borta — av detta följer, att denna isotop av grundämne 102 aldrig kan framställas i några större mängder och följaktligen ej heller få någon praktisk användning. Livslängden är dock tillräckligt lång för att möjliggöra kemisk identifiering samt studium av elementets kärnfysikaliska egenskaper. Därigenom bidrar denna upptäckt till ökad kännedom om materiens struktur.

Kemiskt sett är grundämne 102 mycket likt de s. k. sällsynta jordarterna, vilka först upptäcktes i mineral från Ytterby i Stockholms skärgård och av vilka ett stort antal isolerades av svenska forskare i mitten av 1800-talet.

Omfattande forskning

Upptäckten av det nya grundämnet har föregåtts av ett omfattande forskningsarbete. Ända sedan 1953 har man vid Nobelinstitutet bedrivit undersökningar för studium av mycket tunga element, de s. k. transuranerna, såsom neptunium, plutonium, americium och curium. Olika vägar har prövats för framställning av dessa. I USA och Kanada har man tillgång till kärnreaktorer med så kraftiga flöden av neutroner, att de nämnda grundämnena steg för steg kunnat byg-

**Nobelvinnare:
Ett fint arbete**

En av 1951 års nobelpristagare i kemi, professor Glenn Seaborg från Berkeley, där alla s. k. transuraner utom nr 102, upptäckts, var med vid den presskonferens där det nyaste grundämnet presenterades. Han är på genomresa till en kemikonferens i Paris, som börjar om en vecka, och skall tillsammans med sin mor besöka släktingar i Bergslagen.

— Ett fint arbete, denna upptäckt, säger professor Seaborg. Nyckeln till den var cyklotronen här i Stockholm. Curium finns på många ställen, men detta är det enda laboratorium som har koljoner av rätta slaget.

På en fråga hur många grundämnen som kan tänkas bli framställda med konst, svarade professor Seaborg att elementen upp till 104 och 105 kan vara möjliga att identifiera kemiskt. Sedan får man ta till konstgrepp som i dag inte kallas för kemiska metoder, sade professorn.

gas upp genom infångning av neutroner i uran som har nummer 92 i det periodiska systemet.

I Sverige har en annan väg valts, nämligen en enstegsprocess, innebärande addition av en tyngre partikel än neutronen, såsom atomkärnor av kol, kväve, syre eller neon. För att dessa joner skall få så hög energi att de reagerar med t. ex. uran — eller som i detta fallet curium — måste de accelereras till mycket höga hastigheter — och det är här, som Nobelinstitutets cyklotron visat sig särdeles lämplig. Det

var på detta sätt och med hjälp av denna cyklotron, som man redan 1954 kunde framställa en isotop av grundämne 100 — det skedde genom bestrålning av uran (92) med syrejoner (8).

På samma sätt skulle man i princip ha kunnat framställa grundämne 102 genom bestrålning av uran med neon (10), och åren 1955-56 gjordes vid Nobelinstitutet ett antal försök i denna riktning, dock med negativt resultat.

Så kom curium

I slutet av 1956 togs från engelskt-amerikanskt håll initiativet till utvidgning av ett tidigare samarbete mellan gruppen vid Nobelinstitutet och kärnforskningslaboratoriet i Harwell till att omfatta även Argonne-laboratoriet i Chicago. Därigenom fick forskarna vid Nobelinstitutet tillgång till grundämne 96, curium, som amerikanerna lyckats framställa i en mängd av några tiotal milligram.

Genom bestrålning av detta ämne med koljoner skulle man kunna tänka sig uppkomsten av element 102, särskilt som den uppnåeliga intensiteten var större för koljoner än för neonjoner. Dessutom är Nobelinstitutets cyklotron f. n. den enda accelerator i världen, som kan leverera tillräckliga ström-

Dyrt att forska

Det är inga billiga saker atomforskarna håller på med. De nu utförda experimenten har möjliggjorts genom anslag ur Knut och Alice Wallenbergs stiftelse samt genom stöd av svenska atomkommissionen och de amerikanska och engelska motsvarigheterna.

Bara det curium som amerikanerna ställt till förfogande kostar en halv miljon kronor — och det var ändå bara något tiotal milligram.

styrkor av koljoner med lämplig energi.

Denna isotop av grundämnet 102 kan därför inte framställas i större mängder och kommer därför inte heller att få någon praktisk användning. Dess livslängd är emellertid tillräckligt lång för att möjliggöra dess kemiska identifiering samt studium av dess kärnfysikaliska egenskaper och därigenom ge ett bidrag till kännedomen om materiaens struktur.

Kemiskt sett är element 102 mycket likt de s. k. sällsynta jordarterna vilka först upptäcktes i mineral från Ytterby i Stockholms skärgård och av vilka ett stort antal isolerats av svenska forskare i mitten av 1800-talet.

Forskare i skytteltrafik

— Bakom det resultatet som vi nått ligger ett omfattande experimentellt arbete och det är fråga om ett av de största forskningsprojekt som utförts vid Nobelinstitutet, säger dr Atterling som på tisdagen, jämte sina kollegor, informerade pressen om vad som skett. Namnfrågan är öppen och kommer sannolikt att avgöras av internationella kemionomen, framhöll han för sin del.

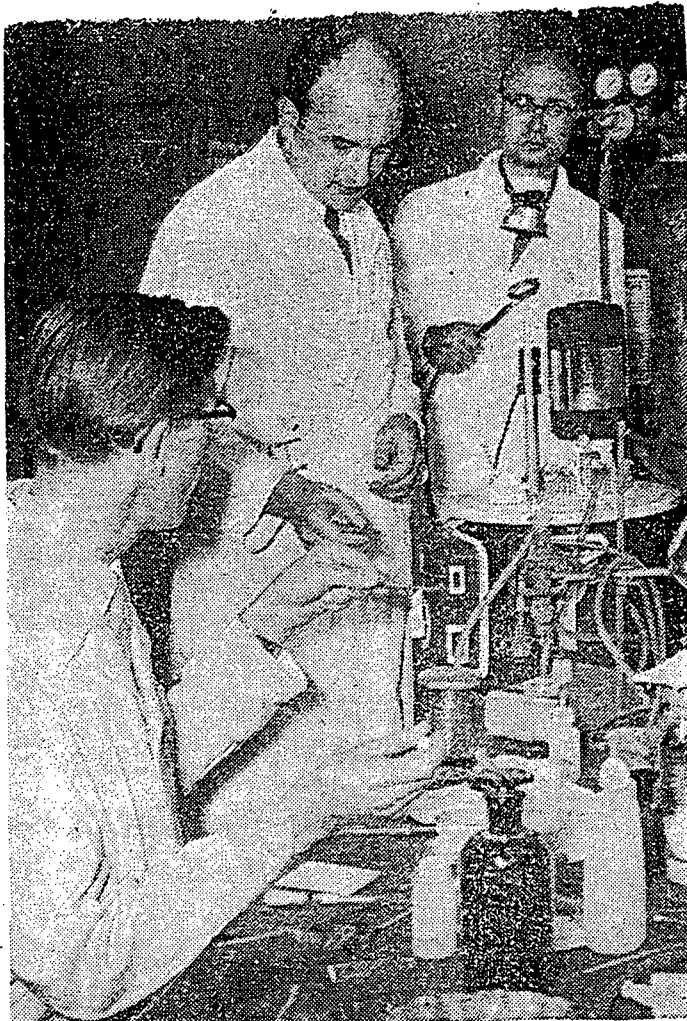
Dr Atterling omtalade att de amerikanska och brittiska forskarna från början av februari och fram till slutet av juni åkt mer eller mindre i skytteltrafik mellan sina egna laboratorier och den stora cyklotronen i Frascati som utgjort en förutsättning för framställningen av element 102.

— Det unika var att vi just i cyklotronen här på Nobelinstitutet hade möjlighet att producera monoenergetiska koljoner, framhöll dr Atterling. Vi har studerat sammanlagt 25 sönderfall och producerat något hundratal atomer under arbetets slutskede.

Motigt i början

Sedan 1953 har vid Nobelinstitutet för fysik bland annat bedrivits undersökningar för studium av mycket tunga element, de s. k. transuranerna. Olika vägar ha prövats för framställning av dylika. Framst i USA och Canada har man genom tillgång på kärnreaktorer med mycket höga neutronflöden kunnat steg för steg bygga upp dessa ämnen genom infångning av neutroner i uran.

Här i Sverige har man på grund av avsaknad av dylika kärnreaktorer ej kunnat använda denna metod. I stället har en annan väg valts, nämligen en enstegsprocess innebärande addition av en tyngre partikel än neutronen såsom atomkärnor av kol, kväve, syre eller neon. För att dessa joner ska erhålla en så hög energi att de reagera med t. ex. uran, måste de accelereras till mycket höga hastigheter; ungefär en sjundedel av ljushastigheten. Denna acceleration kan med fördel åstadkommas i en cyklotron av den typ som finnes vid Nobelinstitutet för fysik i Stockholm.



Separation av element 102 efter cyklotronbestrålnings slut. Kärnkemisterna är fr. v. Lennart W. Holm, Nobelinstitutet, Alan Beadle, Harwell, samt Wilhelm Forsling, Nobelinstitutet.

Den i den nu aktuella upptäckten delaktiga svenska forskargruppen har som nämnts sedan 1953 bland annat studerat kärnreaktioner framkallade av tunna joner. Sålunda lyckades man i början av 1954 framställa en isotop av grundämnet fermium, element 100, genom att bestråla uran med syrejoner i den stora cyklotronen vid Nobelinstitutet.

Ungefär samtidigt framställdes en annan isotop av detta grundämne i USA genom neutronbestrålning av plutonium i reaktor.

Uran var tidigare det tyngsta element, som fanns tillgängligt i Sverige i kvantiteter stora nog för att kunna användas vid bestrålning i cyklotron. För att som produkt erhålla ett tyngre element än 100 måste därför en tyngre kärna än syrets utnyttjas som bombarderande partikel. Sålunda skulle bestrålning av uran med neonjoner i princip kunna resultera i bildning av element 102. Ett antal försök i denna riktning gjordes under åren 1955—56 vid Nobelinstitutet men resultaten blev negativa.

Samarbete ger fördelar

I slutet av 1956 utvidgades på engelskt-amerikanskt initiativ ett tidigare samarbete mellan gruppen vid Nobelinstitutet och kärnforskningslaboratoriet i Harwell, England till att omfatta även Argonne-laboratoriet

i Chicago, USA. Härigenom vanns flera fördelar. Amerikanerna hade genom successiv neutroninfångning i plutonium bland annat framställt några tiotal milligram av grundämne 96, curium. Genom att detta element är i sig självt tyngre än uran, som är element 92, skulle en lyckad bestrålning med kärnor av kol kunna ge element 102.

Det bedömes också att sannolikheten för att en dylik kärnreaktion skulle inträffa borde vara något större än för nyssnämnda reaktion mellan uran och neon. En annan positiv faktor var att den uppnåeliga intensiteten var större för koljoner än neonjoner.

Förberedande arbeten påbörjades i januari detta år varpå experimenten med bestrålning av curium med koljoner startades i början av mars

Början i mars

Efter en del förberedande arbeten i januari och februari i år, kunde man så i mars börja experimenten efter denna princip. 23 mars kunde man som nämnts för första gången observera det nya grundämnet, och sedan försöken fortsatt till i slutet av juni var forskargruppen redo att låta sin upptäckt bli bekant.

Hela tiden har samtliga de utländska medlemmarna av teamet i olika perioder vistats vid Nobelinstitutet och deltagit i experimenten. Första gången element 102 iaktogs var alla utom mr Beadle närvarande.

Sammanlagt har 12 lyckade strålningar utförts och man har kunnat fastställa 25 sönderfall av element 102, allt tillräckligt för att med säkerhet fastställa ämnets existens. Det är ingen överdrift att påstå, att de uppnådda resultaten hör till de viktigaste som gjorts vid Nobelinstitutet i Frascati.

och pågick till slutet av juni. Det visade sig att en framställning av element 102 var nätt och jämnt möjlig. Sålunda påvisades i ett enskilt experiment aldrig mer än fem atomer av element 102. — Som jämförelse kan nämnas att en droppe vatten innehåller ca tretusen trillioner atomer.

En så ringa mängd är givetvis fullständigt osynlig och kan ej heller vägas eller dylikt. Element 102 avslöjar dock sin närvaro genom att det liksom övriga tunga element utsänder radioaktiv strålning, som kan mätas med speciella instrument. I och med utsändningen av denna strålning sönderfaller dock elementet i fråga.

Nobelpristagare lovordar

— A very fine piece of work, säger professor Glen T. Seaborg — 1952 års nobelpristagare i kemi — från Berkeley-universitetet i Californien, som vid ett samtal med Morgon-Tidningen betecknar framställningen som resultatet av ett utomordentligt arbete. Nyckeln till upptäckten låg i cyklotronen här i Stockholm, tillägger han.

På en fråga hur många grundämnen som kan tänkas bli framställda med konst, svarade professor Seaborg, att elementen upp till 104 och 105 kan vara möjliga att identifiera kemiskt, sedan får man ta till konstopgrepp som i dag inte kallas för kemiska metoder, sade professorn.

Professor Seaborg hade på tisdagen kommit till Stockholm i privata angelägenheter och det var alltså en ren händelse att han råkade befinna sig ute på Nobelinstitutet när nyheten delgavs pressen. Han är en av pionjärerna på det område som det här är fråga om och har själv upptäckt åtta grundämnen, bl. a. element 101.

Professorn omtalar att han egentligen är hundraprocentig svensk. Hans mor hette Selma Ericson, hon är från Grängesberg och flyttade 1904 till USA. Hans far är född i Amerika men båda föräldrarna är från Hällefors. Professor Seaborgs mor är med på resan och båda kommer redan på onsdagen att via Eskilstuna åka upp till Kopparberg och Grängesberg. Sedan kommer professorn att resa till kemikongressen i Paris.

Ny utrustning på Fresco

Dr Atterling berättar att han och hans kolleger närmast kommer att ta sig en semester. Men sedan förestår vissa viktiga omändringar i den stora cyklotronen. En reflektorordning bör till det som skall installeras och det kommer i sin tur att möjliggöra nya experiment och forskningsvägar.

Den del av det aktuella arbetet som utförts vid Nobelinstitutet för fysik har möjliggjorts genom frikostiga bidrag från Knut och Alice Wallenbergs stiftelse.

Eftersom en droppe vatten innehåller cirka tretusen trillioner atomer kan det onekligen förefalla litet. Men det räcker för att man med modern sk jonbyttarkemi skall kunna renodla ämnet och sedan mäta dess egenskaper. Kärnfysikerna är främst intresserade av att få fram halveringstiden och energin hos de partiklar som ämnet under sitt radioaktiva sönderfall sänder ut. Det är för övrigt inte uteslutet att man i framtiden kan finna andra varianter, isotoper, av detta ämne som har längre livstid än denna. Efter omkring en timme är nämligen alla de tillverkade atomerna borta.

Någon praktisk användning av nobelium kan inte förutses nu. Där emot vet man redan att det för forskarna har största betydelse. Genom att studera detta elements egenskaper kan de skaffa sig mer kunskap om hur materien är uppbyggd.

De som deltagit i arbetet på att producera nobelium är fil lic Hugo Atterling, fil lic Wilhelm Forsling, tekn lic Lennart W Holm och fil dr Björn Aström från Nobelinstitutet och dr phil Paul R Fields och dr Arnold M Friedman från Argonne-laboratoriet i Chicago, vilket tillhör amerikanska atomenergikommissionen, samt engelsmännen dr John Milsted och mr Alan B Beadle

från Harwelllaboratoriet, tillhörigt engelska atomenergimyndigheten. Arbetena har i de tre länderna bekostats med medel från bl a Wallenbergstiftelsen, engelska atommyndigheten och amerikanska atomenergikommissionen.

Atomerna i karusell

Tillverkningen av nobelium har skett så att man tagit defekta kolatomer. Dessa tunga koljoner har fått åka karusell i den stora cyklotronen vid Nobelinstitutet, vilket är den enda apparat i världen som kan accelerera koljoner till de energier som behövs och så att de alla får något så när lika energi.

När koljonerna nått en hastighet av ungefär en sjundedel av ljusets — dvs drygt 4 000 mil/sek! — har de slungats in i en måltavla. Denna har bestått av ett annat konstgjort grundämne, curium, som har nummer 96 i periodiska systemet och som finns tillverkat på flera håll i världen. I detta fall kom måltavlan från USA. Hundra miljarder partiklar per sekund (det svarar mot en uttagen strömstyrka av ungefär en tiondels ampère) dansade så mot curiummåltavlan. Därvid bildades nobelium.

I detalj gick det så till att alla protonerna blev kvar i måltavlan, medan fyra eller sex neutroner gick ut.

— Ett fint arbete, kommenterar amerikanske professorn, svensktätlingen och Nobelpristagaren Glenn T Seaborg, som av en händelse var med när upptäckten offentliggjordes på tisdagseftermiddagen i Nobelinstitutet, samtidigt som nyheten släpptes ut i Harwell och Argonne. (Han är på genomresa för att besöka släkt i Eskilstuna och Kopparberg innan han nästa vecka i Paris deltar i den stora internationella kemikonferensen.) Nyckeln till upptäckten är cyklotronen här i Stockholm. Curium finns på många ställen. Men detta är enda laboratoriet som har koljoner av rätt slag.

Professor Seaborg har vid Berkeleyuniversitetet lett arbetet med att framställa åtta av de från och med nu tio konstgjorda elementen. De kallas transuraner eftersom de är tyngre än uran, vilket är det tyngsta grundämnet naturen har att uppvisa, i varje fall på vårt jordklot. Alla tio transuranerna utom nobelium har framställts i Berkeley.

Det är möjligt att nobelium är ett av de sista konstgjorda grundämnen som kan påvisas med hjälp av kemiska metoder. Professor Seaborg gissar för sin del att eftersom grundämnen får allt kortare livstid ju tyngre de blir kan man nog bara identifiera upp till element 104 eller 105 kemiska metoder, om och när man får fram de ämnena. Kanske kan man sedan framställa och fastställa ytterligare några element genom indirekta mätmetoder.

Transuraner kan ha existerat vid skapelsen

En del av transuranerna, kanske också nobelium, kan ha förekommit i naturen just i det ögonblick då vårt solsystem skapades. Sedan dess är ämnet emellertid säkert obefintligt, i varje fall i hela vårt solsystem. Först i år har man lyckats få fram det, dock efter en annan metod än den naturen kan tänkas ha använt, om den nu någonsin "tillverkat" ämnet.

— Det har under våren varit en skytteltrafik av deltagare i detta arbete här vid Nobelinstitutet konstaterar lic Atterling, som svarar för driften av den stora cyklotronen. (Den kommer närmaste månaderna att ändras så att man kan ta ut strålen ur cyklotronen, vilket skall ge möjligheter till nya typer av försök.) Det är inte för mycket sagt att detta är det största internationella arbete som gjorts här.

Medan forskarlagerets utländska



Här pekar en av de två amerikanska deltagarna, dr phil Paul R Fields, i det svensk-engelsk-amerikanska forskarlageret ut platsen för det nya grundämnet, nobelium, på tablan över grundämnenas periodiska system.

medlemmar kommit och rest har man arbetat fram resultatet. Den 23 mars var alla så när som mr Beadle med då man första gången fick radioaktiva atomer i måltavlan, vilka preliminärt tillskrevs element 102. Senare arbeten, sammanlagt ett dussin lyckade bestrålningar, har konfirmerat resultatet. Man har då mätt sig till existensen av s k alfaradioaktivitet. De utsända alfapartiklarna (bestående av två protoner och två neutroner) har mätts och man har kunnat identifiera ämnet och en del av dess egenskaper. Till nio tiondelar har de teoretiska förutsägelserna om ämnet besannats.

Ett misslyckat försök

Det är inte första gången Nobelinstitutet studerar transuraner. Det har pågått sedan 1953, och 1954 lyckades man där framställa grundämnet 100, kallat fermium. Den gången bestrålade man uran med syrejoner. Ungefär samtidigt framställdes en annan isotop av fermium

i USA genom neutronbestrålning av plutonium i en atomreaktor. I framtiden kan man vänta att bli så: en ny stor, s k linjär accelerator i USA skall ge ytterligare goda möjligheter att framställa transuraner.

Innan man lyckades få fram nobelium på det beskrivna sättet gjordes vid Nobelinstitutet ett försök att bestråla uran med neonjoner för att få element 102. Det lyckades nu inte varför man fick övergå till att ta en måltavla av tyngre atomer än uran och lättare "kulor" än neonjoner att skjuta in i målet.

I slutet av 1956 utvidgades på engelsk-amerikanskt initiativ ett tidigare samarbete mellan Nobelinstitutets grupp och Harwellforskare till Argonnegruppen. Amerikanerna hade genom successiv neutroninfångning i plutonium framställt några tiotal milligram av grundämnet 96, curium. A svenska kunde man accelerera koljoner till lämplig energi (läs: hastighet). I januari började man förbereda arbetet i Stockholm och sedan i mars har man lyckats få fram element 102.

Livslängden för nobelium är visserligen kort, men räcker till för att studera dess kärnfysikaliska egenskaper och därmed ge ett bidrag till ökad kännedom om materiens struktur. Kemiskt sett är element 102 mycket likt de s k sällsynta jordartsmetallerna, vilka i allmänhet har smältpunkter kring eller något under 1 000 grader och kokar vid bortåt dubbla temperaturen. Deras täthet varierar mellan 6 och 10 g/kbcm och deras atomvikter ligger mellan 138 och 175.

Nästa stora steg i utforskandet av konstgjorda grundämnen kanske inte blir nummer 103, eftersom det i regel anses vara lättare att tillverka ämnen som har jämna ordningsnummer. Det är också med grundämne nummer 104 som de största överraskningarna kanske ändå väntar forskningen. Då lämnar man aktinidserien i det periodiska systemet och får söka ett ämne som, enligt lic Forsling, förslagsvis kunde kallas ekahafnium.



"Världsmästaren i grundämnen", professor Glenn T. Seaborg, fotograferad under besöket i Falun. Han flankeras närmast av sin morbror, Karl Adolfsson från Kopparberg och sin mor Selma Seaborg. Längst t. h. sitter kusinen fru Karin Möller och i bakre ledet ses fr. v. Per Möller med svärmodern Jenny Adolfsson samt dottern Mona.

Blev ett svensk-brittiskt-amerikanskt forskarlag, som svarade för bedriften i ett svenskt laboratorium, var en händelse, som svenskättlingen Seaborg noterade med tillfredsställelse.

Den celebre gästens vistelse i Falun blir kortvarig. Redan i början av kommande vecka måste Seaborg befinna sig i Paris för att delta i en internationell kemikonferens, där han skall föreläsa om grundämnena 99, 100 och 101. Efter de senaste dagarnas händelser kanske även 102 kommer in i bilden.

— Har vetenskapen nått det möjligas gräns, när det gäller nya grundämnen?

— Det tror jag inte, säger professor Seaborg. Men naturligtvis är alla antaganden på det här området högst relativa. 104 eller 105 kanske man kan nå på kemisk väg och utnyttjar man andra former för identifikation kanske man en vacker dag får skriva seriebeteckningen 107 eller 108. Men en sak är klar. Varje upptäckt blir en lika angenäm överraskning. Förekomsten av ett nytt grundämne förbehådas sällan för forskarna. Då jag kom till Stockholm för några dagar sedan och av en händelse fick vara med om när 102 uppstod, så var det en absolut nyhet för mej, men en mycket trevlig sådan.

Flottarkärlek i bagaget.

När Glenn Seaborg senast gjorde Sverige den äran, det var 1951, vände han till USA med det gyllene nobelpriset i kappsäcken. Den här gången har han magasinerat svenska landskapsintryck med hjälp av filmremsan och ett betydelsefullt inslag i resgodset utgör alla de grammofonskivor han försett sig med. I diskoteket hittar man både Alice Babs, Postflickorna, Fridolf Rudin och Snoddas Nordgren, ja den sistnämndes Flottarkärlek har professor för säkerhets skull köpt i två exemplar, för den händelse skivan skulle råka ut i blåsväder.

På resan från Kopparberg hälsade mor och son givetvis på i

Grängesberg och förvissade sig om att fru Selma Seaborgs barnhem vid Lisselmågstorp står kvar.

Celebert besök i Dalarna: Dala-Demokraten 7/13/57

Glenn A. Seaborg tror på "108" och har Flottarkärlek i väskan

Nobelpristagaren och kärnfysikern, professor Glenn T. Seaborg är i dessa dagar prominent gäst i Dalarna. DD sammanträffade med honom i en lägenhet vid Britsarvsvägen i Falun. Värdfolket hette Per och Karin Möller. Deras samröre med den världsberömda gästen förklaras av att fru Karins far är Karl Adolfsson från Kopparberg och denne är i sin tur broder till grängesbördiga fru Selma Seaborg, som är mor till atomprofessorn och nu följt med på resan till Sverige och släktbesöken i Dalarna.

Professor Seaborg har varit i Sverige en knapp vecka och bl. a. hunnit hälsa på släktingar i Eskilstuna och Kopparberg. Sistnämnda platsen var för övrigt uppehållsort före resan till Falun.

Under en kort visit i Stockholm hann den berömda atomforskaren

vara med om det märkliga tillfälle när grundämnet med beteckningen 102 presenterades vid Nobelinstitutet för fysik vid Frescati i Stockholm. Den händelsen berörde fackmannen Seaborg i högsta grad. Han är själv verksam vid Berkeleyuniversitetet i Kalifornien, en institution

som även kallats världens främsta grundämnesverkstad. Av tio möjliga »konstgjorda» grundämnen har icke mindre än nio framställts vid Berkeley och grundämnet 102 är alltså det första som producerats i en cyklotron på annan ort. Att det

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8/7/57W

By SCIENCE SERVICE

BERKELEY, Calif., Aug. -- A new kind of plutonium, the atomic fission bomb element, has been discovered by a team of University of California scientists.

The new isotope is plutonium 233. It is the 13th known chemical twin of plutonium. Isotopes are varieties of the same element, having the same chemical properties but different structure inside the nucleus.

Plutonium 239 is the most important isotope, being fissionable by slow neutrons and capable of sustaining a fission chain reaction. The A-bomb dropped on Nagasaki in World War II was a plutonium bomb.

Plutonium was first produced artificially in 1940 by a team of scientists that included Dr. Glenn T. Seaborg of the University of California. Now Drs. Seaborg, T. Darrah Thomas, Robert Vandebosch and Richard A. Glass report their experiments identifying the new plutonium isotope in the current technical journal for physicists, Physical Review (June 15), just issued. Their studies were made at the University of California's Radiation Laboratory here.

Teach More Science, Dr. Seaborg Urges

"We have a critical shortage of scientists and engineers," Nobel Laureate Glenn T. Seaborg, of the University of California, said today.

Speaking before the Commonwealth Club in San Francisco, the UC chemistry professor and discoverer of five new elements told the clubmembers that "practically all studies show that a serious loss of potential scientists occurs in high school."

"We must do something to inspire more high school students through the improvement of the quality of science teaching, which can be done by improving the positions of such teachers to lure more able people into the profession.

"I firmly believe that a knowledge of science is an important element in a liberal education.

"I urge that more science, math, chemistry, physics, biology and geography be taught in grade and secondary schools," he said.

OVERFLOW AUDIENCE

Turning to the field in which he is most famous, Dr. Seaborg told an overflow audience at the Sheraton-Palace Hotel that atomic energy is going to play an important part in the life of everyone and it is something we will have to understand.

"A pound of uranium, when it goes through the plutonium intermediate, is equivalent in heat and energy to about 10,000,000 kilowatt hours of electrical energy, or to the energy obtained by burning 1500 tons of coal.

"A few pounds of uranium a day could meet all the energy requirements of San Francisco," Dr. Seaborg said.

A ton of granite contains more potential heat energy due to its uranium and thorium content than does a ton of coal, he added.

He went on to explain that we will need atomic energy.

"Our energy requirements will have increased to such a point by 1980 that usual fuels—oil, coal, wood and gas—will be inadequate.

"There is enough uranium to

take up the slack," he said.

But there are very difficult engineering problems to be solved before "this pandora's box" can be opened, Dr. Seaborg said.

Atomic energy is not the answer to all propulsion problems, he noted.

"It will never be possible to use these nuclear energy devices for propulsion of ordinary autos because of the weight of the shielding material. But boats and large airplanes can use them," he said.

"It is too early to be able to say whether nuclear energy will be able to compete in cost with other forms of energy such as coal, but it should be emphasized that nuclear energy will be important regardless of eventual outcome of the cost situation because of its concentrated form and its possibility of doing things that no other form of energy can do at any price."

Dr. Seaborg Sees A-Fuel in Future

A few pounds of uranium could meet all the daily energy needs for San Francisco, Dr. Glenn T. Seaborg of the University of California said yesterday.

He suggested the time is fast approaching when many American cities may turn to atomic energy as a supplement for conventional fuels.

FUEL SUPPLY

The Nobel prize winner and professor of chemistry told a Commonwealth Club luncheon our sources in the United States of common fuels — coal, gas, oil and wood—will be inadequate by 1980, according to the best estimates.

Atomic energy, he said, will be the obvious answer to the shortage.

He said a pound of uranium as it is currently used is equivalent in heat energy to about 10 million kilowatt hours of electricity or to the energy obtained by burning about 1500 tons of coal.

"A few pounds of uranium per day could meet all the energy requirements for San Francisco," Dr. Seaborg said. "A couple of thousand tons per year would take care of the present electrical energy requirements of the entire U. S. and a few times this much would take care of the whole world."

COST FACTOR

"It is too soon to be able to say whether nuclear energy will be able to compete in cost with other forms of energy such as coal," the scientist declared. "However, the present cost of electrical energy is greater, in some areas, and in some places in the world the cost is much greater, so that nuclear energy will in any event be competitive in such situations."

Dr. Seaborg said it will never be possible to use atomic reactors for running

ordinary automobiles because of the weight of material used to shield the devices. But he said it would be possible to use them for propulsion of boats or even large airplanes.



GLENN T. SEABORG

*Scans Atomic Future
S.F. Examiner 2/10/57*

Club Told of A-Power Need

Energy to supplement the supplies of coal, wood, gas and oil will be needed by 1980 when the country's sources of

conventional fuels are expected to become inadequate, a noted University of California scientist said yesterday.

Dr. Glenn T. Seaborg, Nobel Prize winner in chemistry and codiscoverer of five new elements, spoke on the future of atomic energy at the Commonwealth Club's luncheon at the Sheraton-Palace Hotel.

Doctor Seaborg pointed out that the population is increasing at a high rate and energy consumption per capita is rising some 3 per cent a year.

HARD PROBLEMS.

"Our energy requirements will have tripled by 1980," the scientist said. "Unfortunately, there are a number of very difficult engineering problems to solve before we can completely open this Pandora's box of nuclear energy."

These problems are that the reactor which will produce the energy must be shielded and everything must be operated by remote control, behind thick shields, he said.

He added that the devices can be used on boats or large airplanes, noting the recent commissioning of the submarines Nautilus and Sea Wolf.

Doctor Seaborg noted the critical shortage of scientists and engineers, stressing that something must be done to inspire more high school students through the improvement of the quality of science teaching.

The Commonwealth

OFFICIAL JOURNAL OF THE COMMONWEALTH CLUB OF CALIFORNIA

Vol. XXXIII

San Francisco 19, Monday, August 19, 1957

No. 33

Friday, August 23rd, 12:10 p.m.

Sheraton-Palace Hotel



Hon. Moekarto Notowidigdo

Ambassador from Indonesia

"Indonesia After Independence"

A veteran nationalist at the age of 41.—Long a leader of the Nationalist movements—before freedom was granted his country.—During Japanese occupation, secretary of the Indonesian Study Club, a cultural and educational arm of the nationalist revolution—and for these anti-Japanese activities, imprisoned twice.—Former member Executive Committee, Indonesian Nationalist Party—Vice Chairman of its International Affairs Committee.—Inspector General of the Indonesian Foreign Service—former Deputy Delegate to the United Nations.

\$2.75 a plate

Admiral H. D. NUBER, Quarterly Chairman

Club's Radio Net

(Time p.m. *)

OAKLAND, KLX (910) 12:15* Su.
APPLE VALLEY, KAVR 2:15* Su.
CHICO, KHSI, 7* Su.
EL CENTRO, KXO (1230) 6:30* Su.

EUREKA, KIEM (1480) 10:30* Su.
FORT BRAGG, KDAC (12:30) 6:30* Su.
FRESNO, KMJ (580) 6:45* Tu.
MODESTO, KBEE (970) 12:15* Sa.
SACRAMENTO, KFBK (1530) 6:30* Sa.

SALINAS, KDON (1460) 10:30* Su.
SANTA BARBARA, KTMS (1250) 8:45* Su.
STOCKTON, KWG (1230) 8:30* Su.
SUSANVILLE, KSUE (1240) 7* Th.
TURLOCK, KTUR (1390) 6:30* Sa.

Atom Power Can't Run Autos—But England's, and Soon U.S. Factories Must Have It

FRIDAY FLASHES—AUGUST 9TH

From Address by
DR. GLENN T. SEABORG
of University of California
Discoverer of 5 New Elements

"Here is a one pound piece of natural uranium metal, a cube about one inch on the side. This pound of uranium, when it goes through the plutonium intermediate, is equivalent in heat energy to about 10,000,000 kilowatt hours of electric energy or to

the energy obtained by burning about 1500 tons of coal.

Small Amount of Uranium Needed

—A few pounds of uranium per day could meet all of the energy requirements for San Francisco.

A couple of thousand tons of uranium per year would take care of the present electrical energy requirements (some 100,000,000 kilowatts) of the entire United States and

(Continued on next page)

Most Difficult Atomic Problem Is How to Dispose of Dangerous Waste Products

SEABORG (Continued from preceding page)

a few times this much would take care of the whole world.

New Source of Energy Needed

—We will soon need in the United States a source of energy to supplement the conventional fossil fuels—coal, wood, gas, oil, etc. —Our population is increasing at a high rate—it should increase by 50 percent by 1980—and, equally important, our energy consumption per capita is increasing some 3 percent per year. Thus, our energy requirements will have increased by a factor of three by 1980.

—The best estimates indicate our sources of fossil fuels in the United States then will be inadequate. In most European and Asian countries, the nuclear source of energy is needed now. Great Britain needs nuclear energy now if it is to survive as a first class power.

Available in Large Quantities

—Fortunately, uranium (and thorium) is available in large quantities in many places throughout the world.

There are apparently hundreds of millions of tons of uranium in the world of such concentration that it will be economically feasible to recover it and so take care of the world's energy requirements for hundreds of years. Unfortunately, there are a number of difficult engineering problems: Machines developing such energy must run at high temperatures and this means . . . many problems involving materials of construction, corrosion, etc.

Choosing Construction Materials

—Materials of construction must be chosen from those whose neutron absorption is

small. This limits the choice to uncommon substances. Adequate coolants must be found and these must not absorb too many neutrons, so uncommon substances such as highly reactive molten sodium, for example, must be used.

—Control of the reaction must be absolutely assured. The reactor must be shielded and everything must be operated by remote control, behind thick shields, because of the dangerous radiation.

Disposing of Waste Material

—The most difficult limiting factor in using nuclear energy for industrial power, is disposing of the tremendous quantity of radioactive fission product waste material. Those problems will be solved, however.

—Presence of radioactive rays makes it necessary to surround reactors with large quantities of shielding material for protection, so nuclear energy devices will be well suited to stationary structures and will be first used in areas where other forms of energy are not readily available. It will never be possible to use these nuclear energy devices for propulsion of ordinary automobiles because of the weight of this shielding material.

Progress Has Been Made

—Great progress has already been made in putting nuclear energy power plants into submarines. Such power plants in large sea-going vessels will make almost unlimited cruising ranges possible. In ten years perhaps few large capital ships will be launched without nuclear power plants.

—To compete in cost with other forms of energy such as coal in this country, overall

(Continued on next page.)

The Commonwealth

Published every Monday by the

Commonwealth Club of California

Office, Hotel St. Francis Phone DOuglas 2-4903
SAN FRANCISCO 19, CALIF. FOUNDED 1903

"Get the Facts" — Founder Adams

Entered as second class mail matter at the San Francisco post office, May 11, 1925. Subscription rate one dollar per quarter, included in monthly dues. Editor, Stuart R. Ward; Managing Editor, William L. Hudson.

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Temporary Developmental Expenditures of 5 Billion Per Year Will Permanently Save 5 Billion a Year

SEABORG (Continued from preceding page)

cost will have to be about six to seven mills per kilowatt hour of electrical energy. Engineers disagree on this possibility.

—There is hope that reactions involving the fusion of light elements, rather than the fission of uranium, can be harnessed for power generation. This is referred to as "taming the H-Bomb" or "controlled thermonuclear power."

Peacetime Applications

—As to peacetime applications of atomic energy, radioactive substances are being used in medicine, chemistry, physics, agriculture, plant physiology, metallurgy, zoology, and industrial research.

—Use of radioactive tracers will soon be saving industry and agriculture a billion dollars per year and, by 1960 or 1962, five billion dollars annually.

—Present research and development expenditure by government, industry, universities and non-profit institutions, costs over five billion dollars a year.

Research Going On

—Much work on nuclear energy machines of many different designs is being carried on by the U.S. Atomic Energy Commission in its many laboratories, such as the Argonne National Laboratory, Oak Ridge National Laboratory, National Reactor Testing Station in Idaho, and laboratories operated by the General Electric Company, Westinghouse Company, and many others. This research work is aimed at solving the problems I have just enumerated, as well as the others connected with this important development.

—There is now widespread interest in the field by many industries, and it is certain they will continue to take advantage of the new possibilities. Many U.S. industries are participating in this new venture. Many local industries are included. The effort of the General Electric Company at San Jose and Pleasanton is well known to you. I might also mention the Bechtel Corporation, Kaiser Corporation, Fluor Corporation and Pacific Gas and Electric Company, among other local participants.

Shortage of Scientists

—As to our critical shortage of scientists and engineers—practically all studies show that a serious loss of potential scientists oc-

curs in high school and in the step from high school to college or university. We simply must do something to inspire more high school students through the improvement of the quality of science teaching. This can only be done by improving positions for such teachers, to lure more able people into the profession.

—To entice a larger proportion of high school graduates into scientific fields, it will be necessary to improve the status of the scientist to the point where the attraction will compete with careers in other profession and in business.

Sufficient Knowledge Needed

—One of the large industrial concerns in our country has said, after partially defining culture as 'a particular stage in civilization and the particular features of that stage,' and a cultured man therefore, as 'one who has sufficient knowledge to fit his environment,' that science should now be considered one of the humanities and 'therefore, there is no reason why all men of culture cannot and should not have a reasonable grounding in basic science and an appreciation of its problems.'

—A knowledge of science is an important element in a liberal education. To understand our history, culture, philosophy and ideals, one needs to study science as well as the other disciplines firmly established in the liberal arts curriculum. Every part of everyday living is affected so directly by science that it is essential that he or she have considerable knowledge of scientific principles.

Understanding Science

—What army officer could afford to ignore nuclear physics in planning the makeup of an infantry division, the deployment of troops or the purchase of weapons? What legislator can pass intelligently on the bills before him if he knows no science? Why are such a high percentage of our business executives being drawn from the ranks of scientists and engineers? Even the factory worker in this age of automation finds more and more that he is not using hand skills but operating electrical or electronic control equipment whose nature he wishes he understood.

—We should see that more science, more

(Continued on page 214)

APPLICATIONS FOR MEMBERSHIP

If no objections are filed with the Secretary prior to August 30, 1957, following applicants will stand elected:

- LUND, H. J., banking, American Trust Co., 1853 19th Ave., S.F. By Walton M. Lawrence.
- ABARBANEL, DR. A. R., doctor of medicine, 301 S. Bedford Dr., Beverly Hills, Calif. By Membership Committee.
- FUNSINN, WALTER, executive and owner business Seattle & S.F., San Francisco Lighting & Supply, 1147 Howard St., S.F. By Membership Committee.
- WORTHINGTON, WILLIAM F., attorney, Worthington & Fields, 415 Buena Vista Ave. E., S.F. By Membership Committee.
- MARTINI, LOUIS, Jr., enologist, Louis M. Martini, Rt. 2, Box 136, St. Helena, Calif. By B. H. Critchfield.
- DORAN, JOHN J., Jr., electrical engineer, Calif. Public Utilities Commission, 2335 Turk St., S.F. By Manley W. Edwards.
- SHOEMAKER, LEIGH S., county supervisor, Sonoma County, Court House, Santa Rosa, Calif. By Robert Morris Harkness.
- BENSON, JAMES F., budget specialist, Dist. Pub. Wks. Off. 12nd San Bruno, 1649 Borden St., San Mateo, Calif. By Gilbert R. Guerin.
- KLEE, CECIL H., school administrator, Arvin Elementary School District, 458 Franklin, Arvin, Calif. By Clifford L. Dochterman.
- ALFORD, ROBERT E., real estate appraiser & assistant manager, Modesto Bldg. & Loan, 1425 Glenwood Dr., Modesto, Calif. By Membership Committee.
- ESTEP, RUSSEL A., realtor, Iown Estep Realty Co., 1471 El Camino Real, Belmont, Calif. By Lean A. Jenkins.
- BARBER, DR. LOUIS M., physician & hospital administrator, San Joaquin County, 2008 Cedar Way, Stockton, Calif. By Weldon W. West.
- WARE, LEONARD, lawyer, Partridge, O'Connell & Partridge, 1710 Shell Oil Bldg., S.F. By John G. Fall.

August 16, 1957 TOM B. COUGHRAN, Secretary

Dr. Glenn Seaborg Answers Questions re Atomic Energy

SEABORG (Continued from page 211)

mathematics, more chemistry, more physics, more biology, more geography are taught in the grade and in the secondary schools."

Answers to Written Questions from Floor:

Q: (Vern Peugh and John L. Simpson) Possibilities of producing electrical current directly from nuclear reaction? **A:** That is a hope for the future, but we are still too ignorant to know how to go about it.

Q: (Bruce McKae) Why is Pu-239 not now usable in reactors? **A:** Because plutonium 239 is extremely dangerous to handle. Even an infinitesimal amount taken internally may bring death—you will recall the group of young women some years ago who died lingering deaths as the result of having touched brushes to their lips to moisten them while they were painting luminous figures on watch dials with a radium paint.

Q: (Frank Glann) Do we have to have the Nevada tests—you stated you have other ways to test nuclear energy? **A:** I did not state that we have other ways of testing nuclear weapons. There is not time to answer this question completely, but it all boils down to the question of the risks of a relatively slight amount of fall-out as against the enormously important problem of adequately defending the United States.

Q: (Lyle Cook) What is your opinion regarding the continued testing of nuclear

SECTION LUNCHEON

St. Francis Hotel — Unless Otherwise Noted

Monday, August 19th

CITY PLANNING—"Regional Planning—A Survey Viewpoint," by Dr. Samuel E. Wood, Research Director, Assembly Interim Committee on Conservation, Planning & Public Works, Sacramento

EDUCATION—"Critical Analysis of Section Study on School Finances," by A. Alan Post, Legislative Auditor.

INDUSTRIAL RELATIONS—"Power and Morality—Labor and Management" by Frank P. Foisie, Vice President, Federated Employers of San Francisco.

Tuesday, August 20th

BUSINESS ECONOMICS—"How the Department of Finance Looks Ahead for California," by Elton Andrews, Local Planning Officer, Department of Finance.

Wednesday, August 21st

MEDITERRANEAN PROBLEMS—"Ways & Means of Settling the Arab-Israel Conflict," by Professor Christina Phelps Harris, Curator Middle Eastern Collection and Research Associate, Hoover Institute, Stanford.

AGRICULTURE—"Assessing Land Zoned for Agriculture on Its Use, New Law," by State Senator George Miller, Jr.

Thursday, August 22nd

INTERNATIONAL RELATIONS—"What U.S. Foreign Policy Will Best Serve Our Vital Interests?" By Section Members.

NATIONAL DEFENSE—"What System of Recruiting Armed Forces Manpower Is Best Under Existing World Conditions?" by Col. Richard J. Stillman, G.S., G-1, Sixth Army and Lt. Col. Harley N. Miller, Reserve Component Division, Sixth Army.

WATER PROBLEMS—"California's Battle on the Colorado River," by Gilbert F. Nelson, Assistant Attorney General & Attorney for Colorado River Board of California.

Monday, August 26th

EDUCATION—"Problems in Teacher Compensation & Merit Pay," by Bert W. Levit, President, San Francisco School Board.

Tuesday, August 27th

HIGHWAYS & TRANSPORTATION—"What's Ahead for Bay Area Rapid Transit?," by Robert E. Nisbet, Attorney-Secretary, Alameda-Contra Costa Transit District.

weapons with reference to radio-active fall-out? **A:** Same answer.

Q: (J. S. Logan and John C. Morrissey) In your opinion, how soon will atomic energy affect sales of petroleum products? **A:** Essentially never—we will need to use all of the recoverable petroleum which mankind has in the ground throughout the world.

Q: If a steamship powered by nuclear energy should be wrecked, would there be a hazard to passengers and crew? **A:** If the ship is properly designed there should be little hazard for crew and passengers. It might be necessary to stay away from the immediate area for a while. If the ship should sink at the dock, say in San Francisco Bay, there could be a need for evacuation of the area for a time, also a considerable problem of neutralization.

Q: In an atomic submarine engine is the power applied by steam? How would it be applied in airplane engines? How would such an engine be cooled? **A:** The energy from nuclear fission comes in the form of heat which can be transformed into electrical energy by more or less conventional methods. However, in some cases rather exotic heat transfer media like liquid sodium might be used.

PHYSICAL CHEMISTRY

Discover New Kind of Plutonium, Element 94

➤ A NEW KIND of plutonium, the atomic fission bomb element, has been discovered by a team of University of California scientists.

The new isotope is plutonium 233. It is the 13th known chemical twin of plutonium, element 94. Isotopes are varieties of the same element, having the same chemical properties but different structure inside the nucleus.

Plutonium 239 is the most important isotope, being fissionable by slow neutrons and capable of sustaining a fission chain reaction. The A-bomb dropped on Nagasaki in World War II was a plutonium bomb.

Plutonium was first produced artificially in 1940 by a team of scientists that included Dr. Glenn T. Seaborg of the University of California. Now Drs. Seaborg, T. Darrah Thomas, Robert Vandebosch and Richard A. Glass report their experiments identifying the plutonium isotope in *The Physical Review* (June 15).

Their studies of plutonium 233 were made at the University of California's Radiation Laboratory, Berkeley.

Science News Letter, August 17, 1957

Seaborg Outlines Nuclear Future

The age of nuclear energy for peacetime uses is fast approaching but it is too soon to be able to say when it will be able to compete economically with other forms of energy.

This view was expressed by Dr. Glenn T. Seaborg, professor of chemistry at the University of California and a Nobel Prize winner, in a recent talk before the Commonwealth Club in San Francisco.

He said that conventional sources of power such as coal, gas, oil and wood will be inadequate by 1980, ac-

ording to the best estimates. Nuclear power will be the obvious answer to the shortage.

Doctor Seaborg said that a pound of uranium as it is currently used is equivalent in heat energy to about 10,000,000 kilowatt hours of electricity or to the energy obtained by burning about 1,500 tons of coal.

He believes that it will never be possible to use atomic reactors for running ordinary automobiles because of the weight of material used to shield the devices. But he said it would be possible to use them for propulsion of ships or large airplanes.

September, 1957

—P.G. + E. Progress—

SF Examiner Sept 29

1957

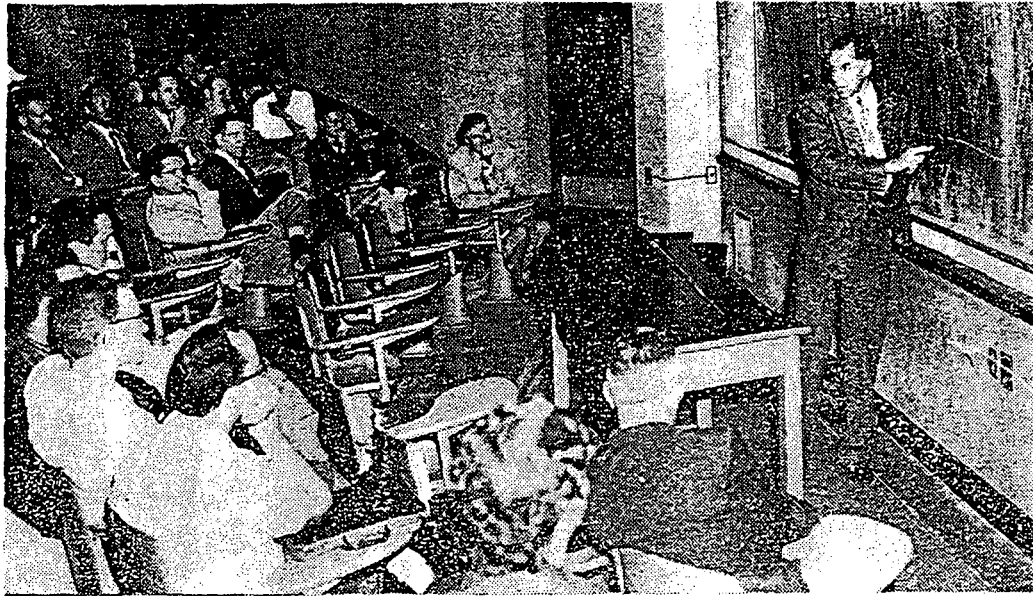
PEEKED INTO Fairmont where Dr. Glenn Seaborg, noted Nobel Prize-winning physicist, addressing Saints and Sinners meeting. "Any questions?" asked Dr. Seaborg. "Yes," piped up Tommy Harris, "do you own any uranium stock?" "Any other questions?" went on physicist. "What's the difference between heavy water and Fairmont water?" asked Harris. Dr. Seaborg went into lengthy, technical explanation. "Just as I thought," nodded Harris. "Heavy water is better for you." "Any other questions?" sighed Dr. Seaborg heavily. "Yeah," shouted Harris, "what's the scale for bartenders?" Dr. Seaborg gave up. Utterly mad to address Saints and Sinners and be Harris'd by Tommy.

Nobel Winner Sees Slow Progress

Eugene Register-Guard

10/26/57

in Creating New Elements



(Register-Guard photo)

NOBEL WINNER SPEAKS HERE—Future discovery of synthetic elements may be predicted but their creation and identification may be slow and difficult work, a 1951 Nobel prize winner said Friday. Glenn Theodore Seaborg, associate director of the University of California radiation laboratory, in a blackboard presentation explains the experimental work being done with transuranium elements, or those following number 92 (uranium).

Creation of new elements will be difficult and their discovery and identification may progress slowly, predicts a Nobel prize winner in chemistry.

Glenn Theodore Seaborg, 47, associate director of the University of California's radiation laboratory, made these comments at a University of Oregon seminar Friday on the development of transuranium elements, or those man-made elements following number 92 (uranium).

Seaborg shared the 1951 Nobel award in chemistry for his discovery of many new elements and especially for his co-discovery of element 94 or plutonium in 1940, which has aided immeasurably in nuclear development and research.

FOUR NEW MEMBERS

He spoke to more than 100 science students and faculty members concerning the 14 elements in the actinium series and in detail concerning the discovery and identification of the four newest members, numbers 99 through 102.

The Berkeley staff has been credited with discovery of nine of the transuranium elements, he

said, and the tenth and newest was discovered by an international team of scientists in Sweden, which found and identified element 102 about six months ago.

The discovery of elements 99 and 100 in the Berkeley laboratories was a surprise development, the guest speaker explained. The find resulted in collection of debris from the first thermonuclear tests in the Pacific on No. 1, 1952, he added.

DRONE PLANE USED

A drone (radio-controlled) plane equipped with filters was flown through the explosion area, and materials were collected. On Dec. 13, 1952 the identity of elements 99 and 100 were officially established, he said.

He noted that isotopes, used in making or establishing the basis for the discovery of a new transuranium element, are no longer created through nuclear bomb explosions, but are captured in atomic reactors. This process requires as long as three to four years in some cases, he commented, and this is one of the slowing factors in the future discovery of new elements.

A bombardment process was

used in the discovery of elements 101 and 102, he said in explaining the general basis of the theory and development of the discoveries.

Scientists face three problems in discovery of future transuranium elements, Seaborg said. These are: in making the elements, in identifying them chemically and in predicting their nuclear properties.

Seaborg, who was a member of the general advisory committee on the Atomic Energy Commission from 1946-50, said it will be difficult to make and to chemically identify elements above numbers 104 and 105.

But there is no theoretical upper limit to the number of new elements which may be created, he said.

It is going to be a long, slow road in making new elements, he added, since scientists must await the material which is created in the atomic reactors.

One such reactor which recently went into service is located on the University of California campus, he said. The radiation lab, of which he is associate director, is equipped with a 50-ton reactor which he said will be valuable in this type of research.

THE CJCSCGA COURIER

Vol. XXIII, No. 1

San Francisco, California

November 14, 15, 16, 1957

Conference Considers '7 Seas' Dr. Seaborg Forecasts Impact of Science

Winner of '51 Nobel Award Will Speak for Banquet

Dr. Glen T. Seaborg, a Nobel Prize winner and professor of chemistry at the University of California radiation laboratory and discoverer and codiscoverer of five elements on the periodic table, will be the guest speaker at the 24th biannual junior college state convention. Dr. Seaborg will speak at the banquet to be held in the Gold Ballroom of the Sheraton-Palace Hotel at 7 p.m. Thursday, November 14.

The director of nuclear chemical research and an associate director (since 1954) of the Radiation Laboratory at U. C. will speak on the "Impact of Science on Your Future."

A member of the general advisory committee of the Atomic Energy Commission by appointment from President Truman from 1946 to 1950, Dr. Seaborg is now a research worker in nuclear chemistry and physics and artificial radio activity and compilation of data in this field.

He is the discoverer of americium, curium, and berkelium; codiscoverer of plutonium, and californium which number 95, 96, 97, 94, and 98 respectively on the periodic table.

This renowned chemist received his Ph. D. from the University of California at Berkeley in 1937 and has since received honorary D. Sc. degrees from the University of Denver, Gustavus Adolphus College, Minnesota, and Northwestern University.

A highlight of the second day



DR. SEABORG

will be the talent show at 10 p.m. Saturday will mark the close of the conference with a third and final assembly, installation of officers, and the final luncheon.

Over 150 papers on his work have

been written by Dr. Seaborg, and he has received many awards and honors.

In 1947 the United States Junior Chamber of Commerce named Dr. Seaborg as one of America's "ten outstanding young men." Two years before he received the Chicago Junior Association of Commerce Distinguished Service Award for 1945 as "outstanding young man of Chicago."

Among the many organizations he belongs to are the American Chemical Society, the Royal Society of Arts (England), and the American National Academy of Sciences.

Dr. Seaborg is interested in student activities and since 1952 has been the faculty representative from UC to the Pacific Coast Intercollegiate Athletic Conference.

AT HOME AND ABROAD

OAKLAND TRIBUNE

11/16/57

The Beginning of Great Ideas

By Raymond Lawrence

What must we do to make the U.S. run faster—in science?

This is not a new problem posed by the Sputniks, for it has deeply disturbed our best scientific brains for a decade or more. Now that Soviet achievements have captured our imagination and provided the sharpest spur since the war, there is an earnest search for solutions.

Some may be good, some bad. The experts will have to weed them out. But nearly all scientists agree the U.S. needs:

1—More basic research;

2—More and better science and mathematics education.

The latter, as we have noted, refers particularly to elementary and high schools, which puts the problem squarely up to local and state school officials.

STALIN'S START

Curriculum changes certainly are indicated. Stalin in the early 30s told the Russians they must master science and technology. They did.

The U.S. Office of Education today finds that in every Russian grade beginning with the fourth there is mathematics including trigonometry. The pupils are given five years of physics, four years of chemistry, and some general science.

Obviously we are not going to emulate the Russian system but there is a serious need for more and better teaching, expanded instruction in these fields, a stimulation of interest in them, and a system of incentives for gifted pupils.

SCHOOL CRISIS

About a year ago Glenn T. Seaborg, the internationally famous University of California chemist, referred in an address to the "school crisis" which he analyzed carefully. He declared:

"We need to insure that a high percentage of our most gifted young people be trained to a very high degree in intellectual and professional fields. The graduates of the near future must exceed those of the past generation not only in numbers but in quality.

"Unfortunately, the alarming crisis in our school system makes it certain that we shall fall far short of this goal."

There are many other facets of our educational situation today but the basic facts are inescapable.

Here, then, is an immediate and transcendent challenge to the intelligent leadership of every community in the United States, including this one.

There is very little that can be done on the local level about basic research but it is a question which should be widely understood.

PURE SCIENCE

Pure science and basic research has no direct relation to military hardware that has so captured the public's imagination.

Read the thumbnail biographies of our top nuclear scientists published this week in Time magazine and you will find that in nearly every case their greatest accomplishments—the ones that had the most revolutionary results—came from speculative contemplation and analysis.

For example Luis Walter Alvarez is known as the "prize wild idea" man; Feynman is engrossed in the study of "weak couplings," which is one of the four forces of all matter; Gell-Mann assigned physical meanings to the behavior of newly discovered particles; Oppenheimer is trying to

understand the fundamental properties of the composition of matter; Schwinger is working on the general principles of quantum mechanics; Seaborg is busying discovering new elements . . .

VALUE OF THEORY

And so it goes with all of the great scientific minds in this country.

The first achievements and discoveries come from purely theoretical processes, which is in direct opposition to the pragmatic anti-intellectualism we discussed yesterday.

Basic research must be free and uncontrolled. It has no relation to practical results and yet some day its consequences may revolutionize the world.

It is not a question of money; it is a question of developing the best brains, the most gifted students, in the country; and then allowing them to pursue their researches without impediment or practical demands.

BEFORE H-BOMB

Edward Teller, before the war, studied thermonuclear reactions in the stars. From it came his concept of the fusion of hydrogen nuclei.

That was pure science. It had no immediate connection with bombs or any other gadget.

But the momentous and eventual consequence was the H-bomb which Teller made possible.

That is one way basic research pays off, although there are countless other examples that could be cited.

Perhaps the ordinary citizen cannot do much about basic research and the generation of scientific geniuses but what he can do is to insist on the improvement of the kind of elementary education this nation needs in order to face the future.

One of Great Scientists

Dr. Seaborg Recalls How It All Began

By PATRICK O'BRYAN
Press Staff Writer

Glenn T. Seaborg looks like a football quarterback.

He's lithe and lean, long and solid. He's pushing 46 but he walks with a virile, youthful swing. He doesn't wear glasses. His eyes are strong and piercing.

He calls himself an adventurer and can remember when the adventure started.

World of Wonder

His high school chemistry teacher one day became aware of a general boredom on the part of his pupils. He accepted it as a challenge.

Gradually, the teacher changed the course of his remarks until, instead of the day's lesson, he was talking about an imaginary world of wonder and bewilderment, of great things yet undone, of secrets to be revealed—even to the secret of life itself.

His eyes fastened on young Glenn and it was as if the teacher were talking only to him.

Imagination Stirred

"I could see images when that man talked. My imagination was on fire. I became so enthused that I said right there, 'That's for me.'"

"There was my challenge. Chemistry! It has never ceased to be a challenge."

That decision made in young Glenn's junior year was one of the greatest ever recorded for science and mankind.

Nobel Prize Winner

Today, his formal title is Glenn T. Seaborg, PhD.

His list of accomplishments is long and impressive. In 1951 he was awarded the Nobel Prize in chemistry.

To some he is the greatest American scientist alive.

On the very day in December, 1942, when an excited band of scientists produced the first chain reaction, in a laboratory only a short distance away, Dr. Seaborg and another small band of scientists were finding a process to produce a fissionable material.

Opened New World

From that combination of discoveries came the atomic bomb, the hydrogen bomb, and the new world of science which has now captured the imagination of even the most uninformed layman.

4 The Houston Press THURSDAY, NOV. 21, 1957



Dr. E. O. Lawrence



Dr. P. J. W. DeBye



Dr. Glenn Seaborg



Dr. Eugene Wigner



Dr. J. Hans Jensen

THE MEN OF TODAY AND THE WORLD OF TOMORROW — Out of the mushrooming white cloud of the first atomic bomb has come the vision of a new world of the future. These five leaders in the world of science are in Houston to urge some 500 Texas researchers to greater efforts in the nuclear research that will hasten the advent of the future. Dr. Lawrence is a professor at the University of California. He was the recipient of the Nobel Prize in Physics in 1939 after building the world's first cyclotron. Dr. Seaborg is another Nobel Prize winner, having the distinction of discovering and identifying 10 new elements of

matter. Dr. Wigner is a native of Budapest, Hungary, who became a citizen of the United States in 1937. He took part in the first atomic chain reaction in Chicago in December of 1952 and is presently at Princeton University. Dr. DeBye is another Nobel Prize winner, for Chemistry in 1936. A native of Holland, he has been a United States citizen since 1946, and is retired head of the Chemistry Department at Cornell University. Dr. Jensen is one of the world's most advanced mathematicians. A graduate of Germany's Hamburg University, he has been Professor of Physics at the University of Heidelberg since 1949.



Are Scientists HUMAN?

1958

Up 'N' Atom ---But Down To Earth

Are scientists human?

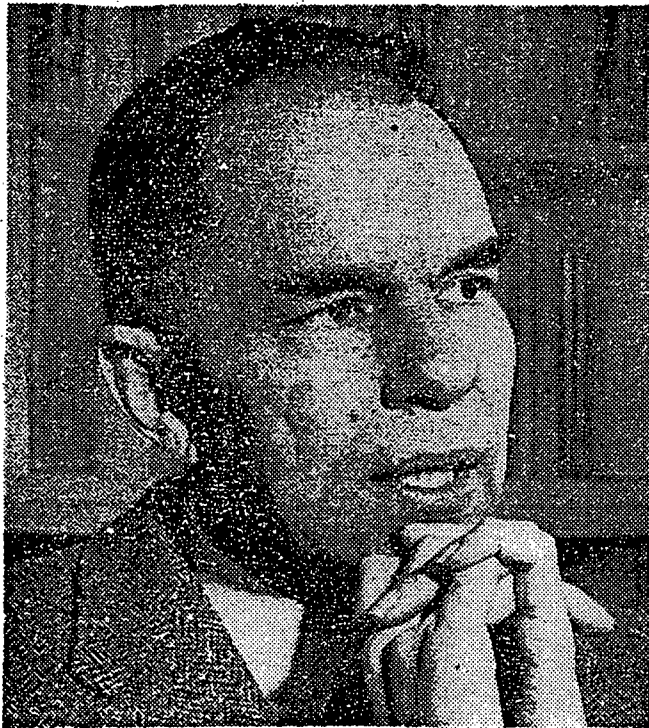
Are they eggheads living in ivory towers?

There's a great hue and cry today, urging more young people to choose scientific careers.

They have the right to ask: What's it like? Is it worth it?

The Call-Bulletin today begins a series of articles taking you along on visits to some of these men and women, now the most talked-about individuals in the Age of Space.

You can judge for yourself what they're like and how they live. And if you're a teen-ager thinking about your career, or the parent of a teen-ager, it may help you decide.



GLENN T. SEABORG

—Call-Bulletin Photograph

By JANE ESHLEMAN
CONANT

Call-Bulletin Staff Writer

BERKELEY, Jan. 14. — Glenn T. Seaborg was a somewhat shy but social boy who had no thought of being a scientist until he reached his junior year in high school.

Today this very tall, ruggedly handsome 45-year-old is associate director of the University of California Radiation Laboratory, winner of the Nobel Prize for chemistry in 1951, and internationally recognized as one of the world's top scientific minds.

He has performed the miracles of alchemy which never came true for his conical-capped predecessors of the middle ages.

He lives in an esoteric world, stratospherically remote from the ordinary lay mind.

FIRST
OF A
SERIES

Sped A-Bomb

His work hastened the development of the atom bomb, and has broken frontier after frontier in the boundless, unexplored territory of science.

A man like this, the layman thinks, must talk another language and live on another intellectual planet which the rest of us can never hope to reach.

Perhaps Dr. Seaborg does. But he's right down here with the rest of us, too.

He says with a grin illuminating his deep-set dark brown eyes, of the only girl in his family of five:

"She can handle any of the boys!"

This is Lynne, 10, the second of the Seaborg brood of 11: 4 Glen road, Lafayette. The boys are Peter, 11; David, 8; Stephen, 6, and Eric, 3.

Lively Household

It's a noisy and lively household:

"They keep bringing home snakes, frogs and turtles.

"Each boy takes it out on the next one down the line. Mrs. Seaborg and I can't get in a word edgewise at dinner..."

The world is by no means narrow for the black-haired Seaborg, who is built on long and lanky lines and takes some pride in the little gold cup that signifies his victory in the Big C golf tournament of 1956.

On one level, according to part of the university's file of his scientific contributions:

"He demonstrated that the heavy elements form a 'transition' series of actinide elements in a manner analogous to the rare earth series of the lanthanide elements."

19-81

Seaborg Urges Close Contact With Soviets

An atomically strong America, generous in foreign aid to the world's underdeveloped countries, and engaged in a massive exchange visit program with the Soviet countries is the best hope for peace in the Atomic Age.

In expressing this view last night before a World Affairs conference on "The International Atom," meeting at Asilomar on the Monterey Peninsula, Dr. Glenn T. Seaborg, famous University of California Nobel Laureate and professor of chemistry, added:

"We should make a direct attack on our differences of opinion with the Soviets by a more intimate contact with our adversaries."

Such visits, in the form of large-scale contacts of people from both camps visiting the other, should not become debating programs on the virtues of the political systems, but to replace faulty information with the truth, the U. C. savant said.

"Perhaps," Dr. Seaborg added, "such visits could even get across the idea that deep down inside the one fellow doesn't really wish to blow the other to smithereens."

While calling for perfection of the ICBM "and to become proficient in all the Buck Rogers array of modern weaponry," Dr. Seaborg cautioned that total armament, in his opinion, would be no solution to the cold war.

Dr. Seaborg, associate director of the U. C. Radiation Laboratory, received the Nobel Prize for his part in discovering several of the trans-uranium elements.

00625

THE Low Down

By PRESCOTT SULLIVAN

Here's a Switch—Cal Recruits Grid Star for Nuclear Physics!

—An example of the kind of proselyting schools in this country should do more of if the United States is to beat the Rushkies in the race for scientific leadership was observed by Jay Jacobus, former local sports-caster, the other night.

Seated at a table in the Tunnel Inn across the Bay were Dr. Glen Seaborg, the University of California's faculty representative to the Pacific Coast Conference, and Frank Ryan, a top rated quarterback from Rice Institute of Houston, Texas.

Although he is not the nosey type, Jacobus was close enough so that he couldn't help but overhear fragments of the obviously serious conversation between the two and he soon gathered that he was listening in on something different.

They weren't talking about football. They were talking about nuclear physics, a field of science in which Dr. Seaborg is a Nobel prize winner and young Ryan is a dedicated student.

Confirming Jacobus' report, Dr. Seaborg last night had this to say:

"I didn't know we were being spied on but the story is true.

"Young Ryan and I had dinner together and during the evening I encouraged him to take his graduate work at the University of California.

"That is what he wants to do. He regards the University of California's nuclear physics department as the Nation's finest and I can't say that I disagree with him.

"Anyway, the young man will continue his studies in Berkeley next fall if his grades hold up during his final semester at Rice.

"I am confident that he'll meet the high entrance requirements. He is a scholarly lad and very serious about making nuclear physics his career."

Hopes to Play for L. A. Rams

Dr. Seaborg went on to say that he was not unfamiliar with Ryan's exploits as a football player.

"I saw him on TV when Rice played Navy in the Cotton Bowl," the distinguished scientist disclosed.

"His team lost but Ryan impressed me as a very fine quarterback."

Ryan, who stands 6-3 and weighs 190, was the Los Angeles' Rams sixth draft choice and, according to Dr. Seaborg, it is possible that he'll be able to combine pro football with his studies.

"He'd like to play for the Rams because he can use the money," Dr. Seaborg said. "Perhaps something can be worked out. If not, his full time will be devoted to nuclear physics in Berkeley, I hope."

Dr. Seaborg will try to get a scholarship for Ryan. We trust there'll be no hitch there. Scholarships for nuclear physicists should be as easy to come by as are those for young men who go to school to eat their lunch—and play football.

BIG STORY? CAL SCIENTIST, RICE GRID ACE IN HUDDLE

By ED SCHOENFELD

It had all the elements of a Big Story.

Huddled over a dimly lit table for two in a Lafayette restaurant were Dr. Glenn Seaborg, Nobel Prize-winning scientist and the University of California's faculty athletic representative to the Pacific Coast Conference, and a young husky athletic-looking chap.

A closer look disclosed Seaborg's dining partner was Frank Ryan, star quarterback of the Cotton Bowling Rice Owls, a draft choice of the Los Angeles Rams.

Could the esteemed scientist-faculty athletic representative actually be prosleyting a football star?

It's a good story, all right. But not the kind that is going to bring the PCC commissioner and his house dicks running.

Dr. Seaborg was enthusiastic to explain the football star's presence. For Ryan, the scientist pointed out, is a determined young man with quite a goal in mind.

The Rice quarterback hopes to be one of the first major college grid stars to become a nuclear physicist.

That's what brought him to the Bay Area. And this tete-e-tete with Dr. Seaborg.

Ryan, the U.C. professor reported, is anxious to do his post-graduate work here if it can be worked out.

If his final grades are OK, the young man wants to play professional football for the Rams and take his early post-graduate work in nuclear physics at UCLA in the off-season.

After a year he hopes to come to U.C. for further training and important research work.

There is a question whether Ryan could do this and still spend four or five months a year playing professional football.

"If any conflict between professional football and this post-graduate work should arise, nuclear physics will be Frank's choice," Dr. Seaborg said.

"He is a very serious boy, one who is determined to make good in nuclear physics."

Dr. Seaborg, a rabid 49er fan, then thought out loud a moment.

"It would be nice if Ryan could play for the 49ers and do all his post-graduate work at California, too."

Turning to Ryan's football ability, the scientist remarked:

"There's no doubt about him being a fine football passer. I brought Frank out to our home and he played a little football with the kids. Threw the ball 60 yards in the air with ease."

Post-graduate students are ineligible for football, he quickly added.



TALK ON ATOMIC RESEARCH—Representative Price (right), Democrat of Illinois, chairman of the research and development subcommittee of the Senate-House Committee on Atomic Energy, talks with Dr. Frederick Seitz (left) of the University of Illinois and Dr. Glenn T. Seaborg of the University of California, witnesses called for a general discussion of basic research in atomic science.—AP Wirephoto.

Science Career Corps Urged

By the Associated Press

Representative McCormack, Democrat of Massachusetts, suggested today the Armed Services might consider creating a special corps for officers who want to make careers in science and research.

Mr. McCormack, House Democratic leader, asked Brig. Gen. Alfred D. Starbird, director of military applications for the Atomic Energy Commission, what he thought of the idea.

Gen. Starbird said it sounded good. He said the services already have a policy, interrupted by the Korean conflict but since resumed, of selecting officers for special schooling and then keeping them generally in assignments related to their specialty.

Mr. McCormack presided at a hearing by a House Government Operation Subcommittee on AEC-Military Relations.

Gen. Starbird told the subcommittee there is a different division of work between the Defense Department and the AEC in producing the newer missile weapons than in earlier development and production of nuclear bombs:

"We in the AEC develop and produce bombs in full. This includes the nuclear parts, the fuzing parts, the firing parts . . . For missiles, we develop the nuclear and firing parts, but the fuzing and the carriers are the responsibility of the Department of Defense."

U. S. LEADS SOVIET, SCIENTISTS FIND

But Committee Warns New
Effort Is Needed to Keep
Ahead in Basic Research

Special to The New York Times.

WASHINGTON, Feb. 3—The chairman of the President's Science Advisory Committee cautioned today that the successful launching of the Explorer satellite must not lessen the new "sense of urgency" in maintaining scientific supremacy over the Soviet Union.

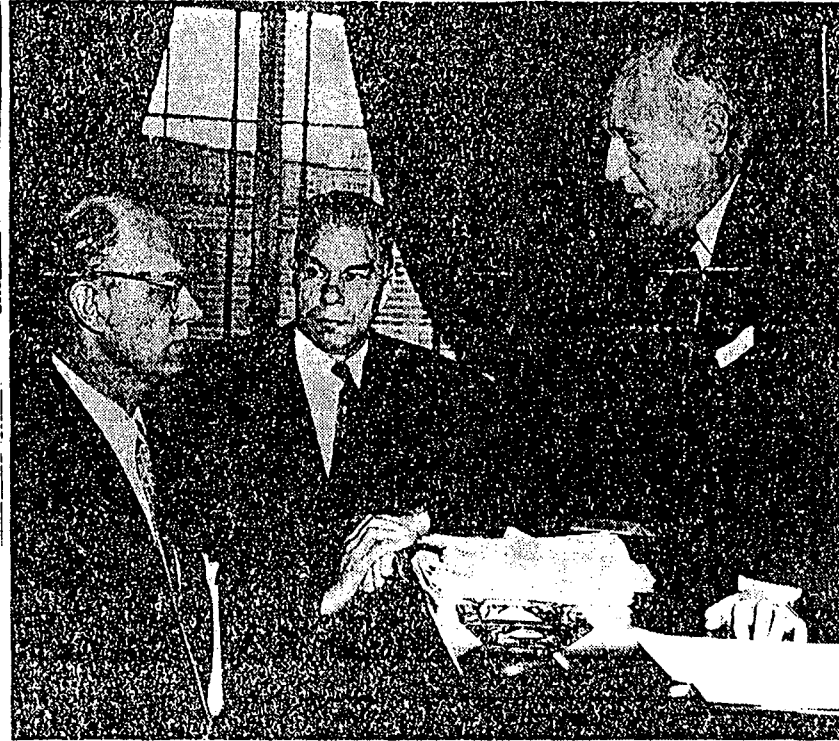
Dr. Isidor I. Rabi, chairman of the seventeen-man advisory committee to President Eisenhower and professor of Physics at Columbia University, said that at present the United States holds a position of leadership in most fields of basic scientific research.

However, the Soviet Union, he said, is "coming along very rapidly" in scientific research.

"Therefore," he said, "there is a possibility that unless we change the situation they will move ahead of us as fast as we moved ahead of Europe" in basic research in the last thirty years.

For the future, Dr. Rabi said, the United States is in an unfavorable competitive position because of "deteriorating" education in the secondary schools. He suggested that the Federal Government must reverse the present educational direction by providing both standards and incentives for better teaching and education.

Dr. Rabi and two other prominent scientists in the nuclear energy field testified before the Joint Congressional Atomic



BEFORE SCIENTISTS TESTIFIED: Representative Melvin Price talking yesterday with Dr. Frederick Seitz, left, and Dr. Glenn T. Seaborg before the scientists gave testimony to a subcommittee of the Joint Committee on Atomic Energy in Washington.

Energy Subcommittee on Research and Development. The subcommittee is holding a series of hearings on the Atomic Energy Commission's basic research program.

Dr. Glenn T. Seaborg of the University of California and Dr. Frederick Seitz of the University of Illinois urged that government support of basic research be increased immedi-

ately by 50 to 100 per cent.

They also urged more Federal money for research facilities and laboratories.

Dr. Seitz said that after the Korean conflict Federal support of basic research needed to level off while research costs continued to increase. It is important, he said, to increase support of research once again since all the evidence indicates

that the Soviet Union is following such a course.

Dr. Rabi urged that basic research be supported "to the extent that we can spend money wisely. My feeling is that the American people are more willing to support research than their leaders or the Bureau of the Budget is willing to believe."

Ike Hosts Dinner To Top Scientists

By FRANCES LEWINE 2/5/58

WASHINGTON, Feb. 6—(AP)—President Eisenhower didn't let a cold dampen a coming out party for the Nation's top scientists at the White House last night.

Smiling and reporting he felt much better, the President presided with Mrs. Eisenhower at the first state dinner to which leading scientists were invited.

Although it was actually a science-military dinner, the scientists, including four Nobel Prize winners, were in the majority among the 98 guests.

There was a special air of excitement because most of the guests had never been to a glittering White House formal affair and because while the dinner was under way the Navy was trying to launch its Vanguard rocket.

VANGUARD FIZZLES

Some three hours after the guests had left the White House the Vanguard fizzled again.

Vanguard Project Director John P. Hagen drank a toast in champagne "Here's to our baby," and then stayed up to await word from Cape Canaveral, Fla.

The President had greeted both Hagen and Wernher von Braun, designer of the Army

rocket that launched the Explorer satellite.

The President sipped champagne and showed little sign of discomfort from the slight cold and sore throat which first had been reported at a late afternoon White House press conference.

He told a newspaperwoman "This afternoon I thought I might have to quit and go to bed, but tonight I feel much better."

EVENING A SUCCESS

The whole evening was a success as far as the scientists and their wives were concerned.

Von Braun, accompanied by his attractive blonde wife, was in an expansive mood as he predicted "We'll be on the moon and back in 10 years."

Perhaps Von Braun spoke for many of the scientists when he said holding the dinner "certainly is an indication of appreciation of the importance of science."



Rep. Melvin Price (D-Ill), right, chairman of research and development subcommittee of Senate-House Committee on Atomic Energy, talks with scientists before hearing their testimony today. Witnesses are Dr. Frederick Seltz, left, of University of Illinois, and Dr. Glenn T. Seaborg of University of California. They were called for general discussion of basic research in atomic science.

Wash. 2/5/58

—(AP) Wirephoto

Moon 'n' Back In This Decade -- Von Braun

By Winzola McLendon

SURROUNDED by colleagues who will help make it possible, scientist Werner Von Braun told fellow White House guests last night that they may be gathering again within 10 years to hail the first round-trip moon travelers.

The German-born genius who was the chief architect of the Army's successful Explorer satellite last week was one of the top scientists and military leaders being honored by President and Mrs. Eisenhower at a tradition-breaking dinner. Confidence that man will not only reach the moon within a decade—but will also be returning—was expressed by Von Braun as he chatted with a group that surrounded him after the formal wining and dining had taken place.

Scientific achievements and hopes were the chief subject of conversation at the first dinner at the White House to honor men of science. President Eisenhower—with a cold and "slightly sore throat"—wasn't staying up to learn whether or not the Navy had launched its mighty Vanguard missile and sent another larger "moon" into orbit.

But many of his guests, particularly Naval Research Laboratory director John P. Hagen, anticipated a sleepless night. "Yes, I'm worrying," he told one reporter and later joined with a uniformed Air Force officer to toast the project.

"Here's to our baby!" he said heartily.

Guests numbered 98, the biggest crowd to sit down in the State Dining Room during the current series of White House dinners. However, as many as 102 have

been seated around the E-shaped table.

With Valentine's Day so close, red was Mrs. Eisenhower's color choice for the evening and everything was keyed to her scarlet tulle gown. Three big hearts of red carnations were framed in greenery on the mantlepiece, and masses of the same flowers were arranged in gold bowls and soup tureens on the table.

Dinner began with pineapple served in the half shell and terrapin soup. The lobster Newburgh course was followed by roast beef, served with stuffed potatoes, braised endive and a tossed salad. For dessert, there was a tutti fruti bombe with ladyfingers. Four wines were served.

In paying tribute to the military, President Eisenhower didn't forget one of the Nation's greatest living retired soldiers—his old boss, Gen. George C. Marshall. An invitation was extended to the Marshalls, but they were unable to attend.

Although her husband was outranked in protocol, there wasn't a wife present getting more attention than the beautiful blonde Mrs. Werner Von Braun. German-born several years younger than the scientist who was one of the chief architects of the Army's Explorer satellite, Mrs. Von Braun was turning heads with sleek debutante good looks. She wore a gold-and-red lame creation which women all over the room were acknowledging in whispers as the handsomest in sight.

Mother of two girls, ages 8 and 5, Maria Van Braun

Scientists Shine at 'First'

was married in 1947 and is now an Alabama housewife. In addition to being beautiful she is accomplished and includes flying among the enthusiasms she shares with her brilliant husband.

THE EISENHOWERS did not linger long, although he had been in buoyant spirits throughout the evening. He stood smiling beside a gaily-red-gowned First Lady to greet the first arriving guests at 8 p.m. and was still grinning and chatting as he shook hands with the 150 late-comers who were invited after dinner for entertainment and light refreshments.

"I thought I'd have to go to bed this morning," he said at one point, referring to his slight indisposition. "But tonight I feel much better." With humor, he explained he thought he probably caught the cold on Friday while attending a Republican breakfast, since that was the last time he had been exposed to a "lot of people."

Before bidding his guests goodnight and taking the elevator upstairs with Mrs. Eisenhower, the President sipped a glass of champagne. "This is California champagne," he quipped, "notice you can taste the grapes in it."

As the Eisenhowers entered the East Room to take their seats for the musicale, the band burst into The Army Song, adopted from the old field artillery song, "The Caissons Go Rolling Along." The Eisenhowers and the Quarleses—she wearing a pink gown of Thai silk—sat side by side in gold arm chairs upholstered in blue. The rest of the other guests sat in the regular chairs.

Laughter was loud and long during Miss Russell's hilarious performance, the

Eisenhowers being among the most enthusiastic. This was the first time they had attended one of her shows.

As for Miss Russell, she confessed before the dinner that she was "terrified." She hadn't known until just a week ago that she was invited to the White House. During her performance she went into her Texas version of Carmen, then a takeoff on the "President of the Women's Club" and also one of her typical musical appreciation numbers during which she played the bagpipes.

Most of the guests at the musicale represented the "Little Cabinet," the Atomic Energy Commission and the National Science Foundation.

During the dinner Mrs. Brucker confessed to Dr. Killian that she was afraid she wouldn't make it to the moon and back in her lifetime. Killian assured her she would. Mrs. Brucker wore a gown of white brocade and with it a chinchilla wrap.

The Eisenhowers left their guests sipping champagne and nibbling little sandwiches and cookies. The mood was light, with an atmosphere of celebration. One couple—Chief of Naval Operations and Mrs. Arleigh A. Burke—were even moved to dance, and twirled down the red-carpeted hall as the Marine Band played.

GUESTS at last night's dinner and their order on the list issued by the White House were Deputy Secretary of Defense and Mrs. Donald A. Quarles, Secretary of the Army and Mrs. Wilber M. Brucker, Secretary of the Navy and Mrs. Thomas S. Gates Jr., Secretary of the Air Force and Mrs. James H. Douglas, Chairman of the Joint Chiefs of Staff and Mrs. Nathan F. Twining, Army Chief of Staff and Mrs. Maxwell D. Taylor, Chief of Naval Operations and Mrs. Arleigh A. Burke, Air Force Chief of Staff and Mrs. Thomas D. White, Chairman of the Federal Reserve System and Mrs. William McChesney Martin Jr., Special Assistant to the Presi-

dent and Mrs. Elwood R. Quesada.

Also Dr. and Mrs. James R. Killian, Jr., Army Vice Chief of Staff and Mrs. Lyman L. Lemnitzer, Air Force Vice Chief of Staff and Mrs. Curtis E. LeMay, Commandant of the Marine Corps and Mrs. Randolph McC. Pate, Gen. Gerald C. Thomas of the National Security Council, and Mrs. Thomas; Vice Chief of Naval Operations and Mrs. Harry D. Felt, Gen. Leon W. Johnson, U. S. Representative, Military Committee of NATO, and Mrs. Johnson; President of the American National Red Cross and Mrs. Alfred M. Gruenther, and Lt. Gen. James H. Doolittle, chairman of the National Advisory Committee for Aeronautics, and Mrs. Doolittle.

Alan T. Waterman, director, National Science Foundation, and Mrs. Waterman, led the scientific contingent and afterward in alphabetic order came Dr. Roger Adams, organic chemist recently retired from the University of Illinois, and Mrs. Adams; Dr. George W. Beadle, professor of biology, California Institute of Technology, and Mrs. Beadle; Dr. Alfred Blalock, professor of surgery, Johns Hopkins University School of Medicine, and his daughter, Mrs. William Sadtler; Dr. Detlev W. Bronk, president of the National Academy of Science and president of the Rockefeller Institute for Medical Sciences, and Mrs. Bronk; Dr. Ralph E. Cleland, botanist, University of Indiana, and Mrs. Cleland; Dr. Farrington Daniels, professor of chemistry, University of Wisconsin, and Mrs. Daniels; Dr. Lee A. DuBridge, a physicist and also president of California Institute of Technology, and Mrs. DuBridge; Dr. and Mrs. John F. Enders; Dr. James B. Fisk, a physicist and executive vice president of the Bell Telephone Laboratories, New York City and Mrs. Fisk; Dr. John P. Hagen, of the U. S. Naval Reserve Laboratory, and Mrs. Hagen; William M. Holaday, director of Guided Missiles, and Mrs. Holaday; Dr. George B. Kistiakowsky, professor of

chemistry, Harvard University and a member of the President's Science Advisory Committee, and Mrs. Kistiakowsky; Dr. Edwin H. Land, physicist and president of Polaroid Corp., also a member of the President's Science Advisory Committee, and Mrs. Land; Dr. Robert F. Loeb, professor of medicine, Columbia University, and Mrs. Loeb; Dr. Marston Morse, professor of mathematics, Princeton University Institute for Advanced Study, and Mrs. Morse.

Dr. W. Albert Noyes, Jr., professor of chemistry, University of Rochester, and Mrs. Noyes; Dr. William H. Pickering, director of Jet Propulsion Laboratory, California Institute of Technology, and Mrs. Pickering; Dr. and Mrs. Edward M. Purcell, Dr. and Mrs. Isidor I. Rabi; Dr. Roger Revelle, professor of oceanography, University of California, and Mrs. Revelle; Dr. Alfred N. Richards, professor of pharmacology, University of Pennsylvania, and Mrs. Richards; Anna Russell; Dr. and Mrs. Glenn T. Seaborg; Dr. S. S. Stevens, professor of psychology, Harvard University; Dr. J. A. Stratton, chancellor and acting president, Massachusetts Institute of Technology; Dr. and Mrs. James A. Van Allen; Dr. and Mrs. Wernher Von Braun; Dr. E. Bright Wilson, Jr., professor of chemistry, Harvard University, and Mrs. Wilson; and Dr. Herbert York, physicist and director, Livermore Laboratory, Livermore, Calif., and Mrs. York.

1458



A. P. Wirephoto

DR. AND MRS. JAMES R. KILLIAN JR.
Wife helped Ike's science adviser spruce up for party

Scientists Attend Big Ike Dinner

Wash. Post

2/5/58

WASHINGTON, Feb. 4 (AP)—President Eisenhower, suffering from a slight cold, gave a formal dinner tonight to some of the Nation's top scientists and military men and their wives.

It was the first time the White House social season included scientists on the list of its state dinner guests. There were more scientists than military men.

There were 27 doctors of philosophy and medicine and two university presidents among the 98 guests at the state dining table. Four of the guests were Nobel prize winners.

Dr. Wernher Von Braun, designer of the rocket that shot the U. S. earth satellite into space, had a chance to meet socially with Dr. John P. Hagen, who directed the Navy's so-far unsuccessful Vanguard satellite project.

The Nobel prize winners

present included Dr. Glenn T. Seaborg, University of California chemist.

Among other guests present were:

Dr. George W. Beadle, California Institute of Technology; Dr. William H. Pickering, director, Jet Propulsion Laboratory; CIT; Dr. Lee A. DuBridge, president of CIT; Dr. Roger Revelle, oceanography, UC; Dr. Herbert York, director, Livermore Laboratory, Calif.

Outranked Scientists

2/15/58

Outnumber Military

By Marie Smith

SCIENTISTS outnumbered the military almost two to one at the glittering state dinner President and Mrs. Eisenhower gave last night. But the military leaders outranked the men of science according to the guest list issued by the White House.

At the top of the list were Deputy Secretary of Defense Donald A. Quarles and Mrs. Quarles and ten lines below was the ranking science representative, Dr. James E. Killian Jr., special assistant to the President, who escorted Mrs. Killian to the formal dinner.

Four Nobel prize winners were among the 31 scientists attending the first official White House dinner at which special social recognition was given to their field.

They were Dr. John F. Enders, professor of Medicine and Virology, Harvard University; Dr. Edward M. Purcell, professor of physics, Harvard University; Dr. Isidor I. Rabi, professor of physics at Columbia University; and Dr. Glenn T. Seaborg, professor of chemistry, University of California. Each was accompanied by his wife.

The 96 guests — largest number to attend a single state dinner in the current series of six being given by the President and Mrs. Eisenhower, dined in splendor in the elegant State Dining Room.

The table was brilliant with color. Huge masses of red carnations blossomed in large-size gold tureens; a part of the White House's recently acquired Biddle gold service. And interspersed with the flowers were gold epergnes laden with bright-hued fruits.

Red carnations were chosen for the decorations in recognition of St. Valentine's day on Feb. 14.

President Eisenhower received his guests with a huskiness in his voice, the result of a "slight cold" he developed on Monday after his return from a week-end at Augusta, Ga. The White House reported the President had slight sore throat also.

IT WAS ONLY natural that dinner talk should be about the recent successful launching of the United States' satellite, "The Explorer," and included among the guests was Dr. Wernher Von Braun, technical director of the Army Ballistic Missile Agency which developed the Jupiter rocket. He was accompanied by Mrs. Von Braun.

Also among the scientists was Dr. James A. Van Allen, who is a professor of physics at Iowa State University and has been very active in the satellite program. He came with Mrs. Van Allen, who borrowed a dress from an Iowa City friend for the dinner.

At 10 p. m., the dinner guests were joined in the white and gold East Room of the White House by more than 100 additional guests for an entertainment program by Anna Russell, international concert comedian.

Miss Russell, who is known for her "imitations" has been described by Music Critic Paul Hume as "the funniest woman alive." It was reported that President and Mrs. Eisenhower had never seen her perform before last night. She was here, however, last fall for a performance at Constitution Hall and last summer played the lead in "Half in Earnest," the musical version of Oscar Wilde's "Importance of Being Earnest" at the Olney Theater.

Last night's dinner was the third in a series given this year by President and Mrs. Eisenhower. Most re-

cent, on January 23, guest of honor was Speaker of the House Sam Rayburn. Another dinner for the Chief Justice and Supreme Court, scheduled for January 30, was postponed because of the death last week of the President's oldest brother, Arthur Eisenhower.

Two dinners are scheduled for the diplomatic corps next week—on Feb. and Feb. 11—with the invitations out alternating in alphabetical order.

GUESTS at last night's dinner and their order on the list issued by the White House were Deputy Secretary of Defense and Mrs. Donald A. Quarles, Secretary of the Army and Mrs. Wilber M. Brucker, Secretary of the Navy and Mrs. Thomas S. Gates, jr., Secretary of the Air Force and Mrs. James H. Douglas, Chairman of the Joint Chiefs of Staff and Mrs. Nathan F. Twining, Army Chief of Staff and Mrs. Maxwell D. Taylor, Chief of Naval Operations and Mrs. Arleigh A. Burke, Air Force Chief of Staff and Mrs. Thomas D. White, Chairman of the Federal Reserve System and Mrs. William McChesney Martin, jr., Special Assistant to the President and Mrs. Elwood R. Quesada.

Also Dr. and Mrs. James R. Killian, Jr., Army Vice Chief of Staff and Mrs. Lyman L. Lemnitzer, Air Force Vice Chief of Staff and Mrs. Curtis E. LeMay, Commandant of the Marine Corps and Mrs. Randolph McC. Pate, Gen. Gerald C. Thomas of the National Security Council, and Mrs. Thomas; Vice Chief of Naval Operations and Mrs. Harry D. Felt, Gen. Leon W. Johnson, U. S. Representative, Military Committee of NATO, and Mrs. Johnson; President of the American National Red Cross and Mrs. Alfred

M. Gruenther, and Lt. Gen. James H. Doolittle, chairman of the National Advisory Committee for Aeronautics, and Mrs. Doolittle.

Alan T. Waterman, director, National Science Foundation, and Mrs. Waterman, led the scientific contingent and afterward in alphabetic order came Dr. Roger Adams, organic chemist recently retired from the University of Illinois, and Mrs. Adams; Dr. George W. Beadle, professor of biology, California Institute of Technology, and Mrs. Beadle; Dr. Alfred Blalock, professor of surgery, Johns Hopkins University School of Medicine, and his daughter, Mrs. William Sadler; Dr. Detlev W. Bronk, president of the National Academy of Science and president of the Rockefeller Institute for Medical Sciences, and Mrs. Bronk; Dr. Ralph E. Cleland, botanist, University of Indiana, and Mrs. Cleland; Dr. Farrington Daniels, professor of chemistry, University of Wisconsin, and Mrs. Daniels; Dr. Lee A. DuBridge, a physicist and also president of California Institute of Technology, and Mrs. DuBridge; Dr. and Mrs. John F. Enders; Dr. James B. Fisk, a physicist and executive vice president of the Bell Telephone Laboratories, New York City and Mrs. Fisk; Dr. John P. Hagen, of the U. S. Naval Reserve Laboratory, and Mrs. Hagen; William M. Holaday, director of Guided Missiles, and Mrs. Holaday; Dr. George B. Kistiakowsky, professor of chemistry, Harvard University, and a member of the President's Science Advisory Committee, and Mrs. Kistiakowsky; Dr. Edwin H. Land, physicist and president of Polaroid Corp., also a member of the President's Science Advisory Committee, and Mrs. Land; Dr. Robert F. Loeb, professor of medicine, Columbia University,

and Mrs. Loeb; Dr. Marston Morse, professor of mathematics, Princeton University Institute for Advanced Study, and Mrs. Morse.

Dr. W. Albert Noyes, Jr., professor of chemistry, University of Rochester, and Mrs. Noyes; Dr. William H. Pickering, director of Jet Propulsion Laboratory, California Institute of Technology, and Mrs. Pickering; Dr. and Mrs. Edward M. Purcell, Dr. and Mrs. Isidor I. Rabi; Dr. Roger Revelle, professor of oceanography, University of California, and Mrs. Revelle; Dr. Alfred N. Richards, professor of pharmacology, University of Pennsylvania, and Mrs. Richards; Anna Russell; Dr. and Mrs. Glenn T. Seaborg; Dr. S. S. Stevens, professor of psychology, Harvard University; Dr. J. A. Stratton, chancellor and acting president, Massachusetts Institute of Technology; Dr. and Mrs. James A. Van Allen; Dr. and Mrs. Wernher Von Braun; Dr. E. Bright Wilson, Jr., professor of chemistry, Harvard University, and Mrs. Wilson; and Dr. Herbert York, physicist and director, Livermore Laboratory, Livermore, Calif., and Mrs. York.

WEDNESDAY, FEBRUARY 5, 1958 **B-1**

EXCLUSIVELY YOURS

Scientists Feted At White House

By **BETTY BEALE**
Star Staff Writer

Scientists unaccustomed to crossing the social threshold of the White House came into their own last night.

Never before in the history of America had the President of the United States and his wife given a state dinner in their honor.

Accused up to now of socializing only with big businessmen, President Eisenhower last night entertained what was probably the greatest number of "eggheads" ever gathered for a formal White House dinner.

THERE WAS ENOUGH GRAY MATTER FROM HARVARD to seriously deplete the faculty should they decide they like it here better.

There was also a preponderance of California scientists who traveled with their wives all the way across the country for this signal honor. Indeed, there was not a single regret for this dinner, said the White House which endeavored to include a representative group from across the country.

The dinner was billed as a "science-military" affair but the laboratory experts outnumbered the military VIP's almost two to one.

They represented mainly chemistry and physics but also botany, medicine, mathematics, jet propulsion, pharmacology, oceanography and even psychology. Obviously if we're going to send men to the moon or around and around the earth in a satellite, the psychology of adjusting them to a small cage hurtling through the infinite is something to be considered.

THE LION OF THE ELEGANT WHITE-TIE BANQUET was Dr. Wernher Von Braun, the handsome German scientist responsible for the Army's Jupiter C that got the first United States satellite into orbit. He was receiving congratulations from all sides.

Mrs. Von Braun was the most striking woman present—a willowy blond in a handsome gown of heavy red and gold brocade with a regal train. She was asked if waiting for the Explorer to get launched was something like waiting for a baby for a couple of years.

"It was like waiting for a baby for 25 years," she replied, indicating how long her husband had been trying to put his design into action.

Her husband predicted, "Man will go to the moon and be back in 10 years."

He thought the science dinner was a wonderful idea. "It's certainly an indication of the appreciation of the importance of science."

Dr. John P. Hagen, head of the Vanguard project, was the second most sought-after guest, especially with the news that the Navy's satellite, twice as big as the Army's, was to be launched last night.

The rocket was exploded when it went off its assigned path.

PRESIDENT EISENHOWER, looked ruddy-complexioned and well, but had gone to bed with a cold at 4 in the afternoon.

"I feel much better tonight," he said, "but this morning I thought I would quit and go to bed." Where did he pick up his cold?

"I went to the Republican breakfast the other morning and that was the last time I was around a whole lot of people. I think it takes a few days for these things to incubate." He didn't sound the least bit hoarse, although many of his guests did.

Picking up a glass of champagne, he observed, "This is California champagne. You can taste the grapes in it," he said with such delight it was obviously meant to be a compliment.

Government official Pearl Pæce, former Kentucky sheriff, came up to the Chief Executive. "For an ailing President you look mighty good, Mr. President," she said. He laughed.

This was during the reception that followed both the dinner and the entertainment afterwards. The Eisenhowers stayed only for about five minutes of it before retiring.

It was during the reception that Dr. James Killian, jr., special scientific assistant to the President, was asked about the published story that the White House was studying a plan to take all outer-space activities out of the Defense Department.

He looked startled. "I have no comment on that," he said. "I have not seen the papers."

AS USUAL MRS. EISENHOWER MATCHED HER GOWN with the flowers on the lavish E-shaped table. At the dinner for the Nixons she wore a gold dress and the flowers were golden yellow. At the dinner for Speaker Rayburn she wore a pink gown and the flowers were pink carnations.

Last night she wore a tiered, full-skirted Valentine red net dress that exactly matched the 21 bouquets of red carnations on the handsome table and the three Valentine hearts on the mantle.

The bouquets were interspersed with gold candleabra holding white tapers and gold compotes filled with oranges, bananas, apples, pears with huge bunches of California "black" grapes dripping over the sides almost to the white tablecloth. Ivy leaves ornamented the fruit and delicate trails of smilax wound in and out the gilded garniture from one end of the table to the other.

There were 98 guests at this party, the largest such function this season.

HAPPILY, THE USUAL SEATING PROTOCOL that accords precedence only to Government rank, was disregarded. Otherwise all the great scientists present would have been placed at ends of the table.

Inasmuch as Secretary of Defense and Mrs. Neil McElroy attended one of the other dinners along with the rest of the cabinet, they were not invited last evening. Hence the ranking guests were the Deputy Secretary of Defense and Mrs. Donald Quarles.

In the four throne-like chairs upholstered in gold-colored damask at the head of the table, the President

and Mrs. Eisenhower sat side by side, with Mrs. Eisenhower on the President's right and Mrs. Quarles on his left. On Mrs. Quarles' left sat Dr. Killian.

Thereafter the scientists and Pentagon personnel more or less alternated with the more prominent of each taking precedence.

FOUR NOBEL PRIZE-WINNERS WERE PRESENT with their wives: Dr. John F. Enders of Harvard (medicine and virology); Dr. Edward M. Purcell of Harvard (physics); Dr. Isidor I. Rabi of Columbia University (physics); and Dr. Glenn T. Seaborg of the University of California (chemistry).

Dr. Alan T. Waterman, director of the National Science Foundation, and Mrs. Waterman, and Dr. Detlev W. Bronk, president of the National Academy of Sciences, and his wife were in the gathering.

And others around the table were Dr. and Mrs. George B. Koistiakowsky (professor of physical energy at Harvard and member of the President's Science Advisory Committee); the director of guided missiles and Mrs. William M. Holaday, Dr. and Mrs. Roger Adams (chemistry, University of Illinois), Dr. and Mrs. George W. Beadle (biology, California Institute of Technology), Dr. Alfred Blalock (surgery, Johns Hopkins University School of Medicine) and his daughter, Mrs. William Sadler, and Dr. and Mrs. Ralph E. Cleland (botany, University of Indiana).

More scientific dinner guests were Dr. and Mrs. Farrington Daniels (chemistry, University of Wisconsin), Dr. and Mrs. Lee A. DuBridge (physics, California Institute of Technology), the executive vice president of the Bell Telephone Laboratories and Mrs. James B. Fisk (physics), Dr. and Mrs. Edwin H. Land (physics, Polaroid Corp.), Dr. and Mrs. Robert F. Loeb (medicine, Columbia University), Dr. and Mrs. Marston Morse (mathematics, Princeton University, Institute for Advanced Study), and Dr. and Mrs. W. Albert Noyes, jr. (chemistry, University of Rochester).

FROM THE JET PROPULSION LABORATORY of the California Institute of Technology came Dr. William H. Pickering with his wife, and there were Dr. and Mrs. Roger Revelle (oceanography, University of California), Dr. and Mrs. Alfred N. Richards (pharmacology, University of Pennsylvania), Dr. S. S. Stevens (psychology, Harvard), the acting president of MIT and Mrs. J. A.

Stratton (engineer), Dr. and Mrs. James A. Van Allen (physics, Iowa State University), Dr. and Mrs. E. Bright Wilson, jr. (chemistry, Harvard), and Dr. and Mrs. Herbert York (physics, Livermore Laboratory, Calif.).

This was the greatest number of out-of-town guests ever attending an Eisenhower dinner. But it was old home week for the scientists. They all knew each other personally from years back or knew each other by reputation.

The military were far from strangers to the White House scene. In the dinner roster of Pentagon guests were Secretary of the Army and Mrs. Wilber Brucker, Secretary of the Navy and Mrs. Thomas S. Gates, jr.; Secretary of the Air Force and Mrs. James Douglas, chairman of the Joint Chiefs of Staff, Gen. Nathan Twining and his wife; Army Chief of Staff and Mrs. Maxwell Taylor, the Chief of Naval Operations and Mrs. Arleigh Burke and the Air Force Chief of Staff and Mrs. Thomas D. White, the latter topping her white gown with a delicate little diamond tiara.

The Marine Commandant and Mrs. Randolph Pate were also present, and Marine Gen. and Mrs. Gerald C. Thomas (National Security Council), special assistant to the President for air, Gen. "Pete" Quesada and his wife; the United States Representative on the Military Committee of NATO, Gen. Leon W. Johnson and Mrs. Johnson; the chairman for the National Advisory Committee for Aeronautics, Lt. Gen. James Doolittle and his wife, and the vice chiefs of staff, Army Gen. and Mrs. Lyman L. Lemnitzer, Air Force Gen. and Mrs. Curtis LeMay and Admiral and Mrs. Harry D. Felt.

THERE WERE TWO GENTLEMEN PRESENT who fell in neither the Pentagon or scientific category. One was the chairman of the Federal Reserve Board, William McChesney Martin, jr., and the other was Gen. Alfred M. Gruenther, president of the American Red Cross, both accompanied by their wives.

Obviously the Red Cross has a close tie to the military. And Mr. Martin, who can step up inflation or deflation with his monetary policies, has much in common with the men who are doing the biggest spending of United States funds, the military.

On the subject of the scientists and military being teamed up at one social function, Dr. Rabi said the scientists were very glad to be with the military, "although we could be grouped with anyone."

The only remaining dinner guest was the woman who staged the after-dinner entertainment and caused the rafters of the East Room to rock with laughter.

Miss Anna Russell, both a singer of note and a comedian, proved again last night

that she is entitled to her reputation as the funniest woman alive.

Her program followed the arrival of 155 additional guests at 10 o'clock. Mrs. Eisenhower and the ladies had already had coffee, liqueur and cigarettes in the Red Room (decorated with white gladiolas) and the President and gentlemen had had the same plus cigars in the Green Room (pink gladiolas).

AT 10 MR. AND MRS. EISENHOWER WENT TO THE BLUE ROOM (yellow gladiolas) to receive the new arrivals. Then the entire company assembled in the East Room (yellow carnations).

The hosts had never before heard Miss Russell and they laughed with the rest at her killing interpretations of Texas Carmen—"the Habanera with a Hoedown"; the lady president of a woman's club; a passionately sentimental song; a madrigal quartet in which she took all parts, and a skit entitled "Wind Instruments I Have Known," in which she put together a bagpipe with appropriate remarks and vocalizing.

Except for her performance, the Marine Band, headed by Capt. Albert Schoeper, played throughout the evening. In addition to all the service marches, they played selections from "My Fair Lady," "South Pacific," "Oklahoma," "Carousel," "Brigadoon," the usual portion of Viennese waltzes and Mrs. Eisenhower's favorite, "Tammy."

So enticing was their popular music that Admiral and Mrs. Burke danced their way out on the red carpet of the front hall.

Reception guests included all the Little Cabinet of the Defense Department, members of the Atomic Energy Commission and of the National Advisory Committee on Aeronautics, and numerous others. Former Governor

of Arkansas and Mrs. Francis Cherry were there, and Mr. and Mrs. Fletcher Plumley, the Deputy Director of Central Intelligence Agency and Mrs. Charles Cabell and the President of the Association of United Scientists and Mrs. Lloyd Berkner.

Asked what she thought of a special dinner for scientists, one scientist's wife replied, "I am a Democrat and anything I might say would sound like sour grapes."

During the reception Dr. Hagen and an unidentified Air Force officer toasted the Vanguard with—"Here's to our baby!" Since it is really

the Navy's satellite, with the Air Force providing the launching site, the toast indicates the extent of the rivalry between the Air Force and the Army that beat them all in the race into space.

Eisenhower Has a 'Slight Cold,' But Attends White House Dinner

N. Y. Times

Special to The New York Times.

2/5/58

WASHINGTON, Feb. 4.—The White House announced today that President Eisenhower was suffering from a "slight cold," but that it was not serious enough to disrupt his activities.

Although he had a sore throat that made his voice husky, the President was host tonight at a dinner for nearly a hundred military and scientific leaders. He also scheduled a news conference for tomorrow morning.

James C. Hagerty, the White House press secretary, said this evening that President Eisenhower had no fever with the cold. "It's very slight, but his throat is a little sore and he has a little huskiness in his throat," Mr. Hagerty said.

Although the indisposition appeared to be minor, attempts by the Administration and Congress to work out a mutually acceptable formula to deal with a real Presidential disability continued. They encountered a legal snag.

House Speaker Sam Rayburn said he favored a law that would create a commission to determine when a President was unable to fulfill his duties.

But Attorney General William P. Rogers indicated at a later news conference that he considered such a method unconstitutional. He said a constitutional amendment was required.

The President's sore throat was first noticed yesterday morning. On Sunday President Eisenhower returned from a golfing week-end at Augusta, Ga., where he played outdoors in unusually chilly weather.

Mr. Hagerty said that he had announced the cold this afternoon only to head off questions that might be raised by the huskiness of the President's voice at tomorrow's news conference.

Tonight's science-military dinner, the first of its kind on the official White House social calendar, was about three-tenths military. All the rest of the guest list represented the scientific community from Boston to California, with the exception of William McC. Martin Jr., chairman of the Federal Reserve Board, and Mrs. Martin.

The highest-ranking scientist, Dr. James R. Killian Jr., with his wife, was placed in protocol with another Special Assistant to the President, Elwood R. Quesada, who made a study of the Air Force. Dr. Killian is the President's special assistant for science and technology.

Their category fell immediately below and just above that of the Vice Chiefs of Staff of the armed services.

Lower Than Forecast

This is a slightly lower place on the protocol list than had previously been suggested as a possibility by Wiley Buchanan, Chief of Protocol. Mr. Buchanan said he had thought that this group might be immediately below five-star generals.

Dr. Alan T. Waterman, director of the National Science Foundation, was ranked immediately under Lieut. Gen. James H. Doolittle, chairman of the National Advisory Committee for Aeronautics.

There the official protocol ended. Dr. John P. Hagan of the Naval Research Laboratory, director of Project Vanguard; William M. Holaday, director of guided missiles, and Dr. Werner von Braun of the Army Ballistic Missile Agency, a key figure in the development of the Explorer-satellite—were listed alphabetically with the non-official guests.

Four Nobel Prize winners were present: Dr. John F. Enders, medicine and biology, Harvard University; Dr. Edward M. Purcell, physics, Harvard University; Dr. Isidor K. Rabi, physics, Columbia University, and Dr. Glen T. Seaborg, chemistry, University of California.

The guests were seated at a table decorated with red carnations. Places were laid for ninety-six. The ranking guests were the Deputy Secretary of Defense, the secretaries of the Army, Navy and Air Force and members of the Joint Chiefs of Staff, all with their wives.

One Entertainer

The sole entertainer for this assembly at a musicale that followed the dinner was Miss

Anna Russell, a British music mimic now of New York.

In the discussion of a Presidential disability plan, Mr. Rayburn proposed a commission heavily weighted with Congressional leaders. The Speaker had previously opposed any change in the laws on this subject.

The commission should consist, he said, of the Vice President, the Secretary of State, the Speaker of the House, the President Pro Tem of the Senate and the leaders of both major parties in the House and Senate.

He said that the Vice President, the Speaker and the President Pro Tem of the Senate should not be voting members because they are in the line of Presidential succession.

Rogers Wants Amendment

The opposing Administration position, as developed today by Mr. Rogers, is that this proposal would violate the Constitution by taking the power of decision on disability away from the Executive Branch.

"I believe it's perfectly clear that the power is in the Executive Branch of the Government," Mr. Rogers said. Any transfer of this power, he said, would require a Constitutional amendment rather than a simple act of Congress.

In answer to a question, he asserted: "I would recommend a veto [of any bill] that transferred the decision on disability from the Executive Branch of the Government."

He indicated that the Administration would like some sort of action by Congress expressing agreement that this power lay with the Executive and that the Vice President, upon accession, would serve only temporarily during the President's disability.

The debate concerns Article I, Section 8 of the Constitution, which gives Congress power to make all "necessary and proper" laws to carry out the Constitution's provisions. Democrats in Congress contend that this clause gives it ample authority to settle the disability issue by enacting a simple law.

Mr. Rogers said the "necessary and proper" clause empowered Congress to enact laws carrying out powers already assigned in the Constitution. But he contended, it does not authorize Congress to transfer powers from a branch of gov-

ernment to which they are already clearly assigned.

LIST OF DINNER GUESTS

Science and Military Leaders at White House State Dinner

WASHINGTON, Feb. 4 (AP)—
Following is the official guest
list for tonight's science-mili-
tary state dinner at the White
House:

Deputy Defense Secretary and
Mrs. Donald A. Quarles.

Army Secretary and Mrs. Wilber
M. Brucker.

Navy Secretary and Mrs. Thom-
as S. Gates Jr.

Air Force Secretary and Mrs.
James H. Douglas.

Chairman of the Joint Chiefs
of Staff Gen. and Mrs. Nathan
F. Twining.

Chief of Naval Operations Ad-
miral and Mrs. Arleigh A. Burke.

Air Force Chief of Staff and
Mrs. Thomas D. White.

Federal Reserve System Chair-
man William McChesney Martin
Jr. and Mrs. Martin.

Special Assistant to the Presi-
dent for Aviation Elwood T. Que-
sada and Mrs. Quesada.

Special Assistant to the Presi-
dent on Science Dr. James R. Kil-
lian Jr. and Mrs. Killian.

Vice Chief of Staff-Army Gen.
and Mrs. Lyman L. Lemnitzer.

Vice Chief of Staff-Air Force
Gen. and Mrs. Curtis E. Lemay.

Marine Corps Commandant Gen.
and Mrs. Randolph McC. Pate.

Gen. Gerald C. Thomas of the
National Security Council and
Mrs. Thomas.

Vice Chief of Naval Operations
Admiral and Mrs. Harry D. Felt.

Gen. Leon W. Johnson, United
States Representative on the Mil-
itary Committee of the North At-
lantic Treaty Organization, and
Mrs. Johnson.

American Red Cross President
Gen. and Mrs. Alfred M. Gruen-
ther.

Lieut. Gen. James H. Doolittle,
chairman of the National Advisory
Committee for Aeronautics, and
Mrs. Doolittle.

National Science Foundation Di-
rector and Mrs. Alan T. Water-
man.

Dr. and Mrs. Roger Adams,
chemistry, University of Illinois.

Dr. and Mrs. George W. Beadle,
biology, California Institute of
Technology.

Dr. Alfred Blalock, surgery,
Johns Hopkins University School
of Medicine.

Mrs. William Sattler, Dr. Bla-
lock's daughter.

Dr. and Mrs. Detlev W. Bronk,
biophysics, president, Rockefeller
Institute for Medical Sciences.

Dr. and Mrs. Ralph E. Cleland,
botany, University of Indiana.

Dr. and Mrs. Farrington Daniels,
chemistry, University of Wiscon-
sin.

Dr. and Mrs. Lee A. Dubridge,
physics, president, California In-
stitute of Technology.

Dr. and Mrs. John F. Enders,
medicine and virology, Harvard
University.

Dr. and Mrs. James B. Fisk,
physics, executive vice president,
Bell Telephone Laboratories, New
York.

Dr. and Mrs. John P. Hagen,
United States Naval Research
Laboratory.

Mr. and Mrs. William M. Hols-
day, Director of Guided Missiles.

Dr. and Mrs. George B. Kistia-
kowsky, chemistry, Harvard Uni-
versity.

Dr. and Mrs. Edwin H. Land,
physics, president, Polaroid Cor-
poration.

Dr. and Mrs. Robert F. Loeb,
medicine, Columbia University.

Dr. and Mrs. Marston Morse,
mathematics, Institute for Ad-
vanced Study, Princeton, N. J.

Dr. and Mrs. W. Albert Noyes
Jr., chemistry, University of
Rochester.

Dr. and Mrs. William H. Pick-
ering, director, Jet Propulsion Lab-
oratory, California Institute of
Technology.

Dr. and Mrs. Edward M. Pur-
cell, physics, Harvard University.

Dr. and Mrs. Isidor I. Rabi,
physics, Columbia University.

Dr. and Mrs. Roger Revelle,
oceanography, University of Cali-
fornia.

Dr. and Mrs. Alfred N. Rich-
ard's, pharmacology, University
of Pennsylvania.

Miss Anna Russell, artist, New
York.

Dr. and Mrs. Glenn T. Seaborg,
chemistry, University of Califor-
nia.

Dr. S. S. Stevens, psychology,
Harvard University.

Dr. and Mrs. J. A. Stratton,
acting president, Massachusetts
Institute of Technology.

Dr. and Mrs. James A. Van
Allen, physics, Iowa State Uni-
versity.

Dr. and Mrs. Wernher von
Braun, Army Ballistic Missile
Agency.

Dr. and Mrs. E. Bright Wilson
Jr., chemistry, Harvard Uni-
versity.

Dr. and Mrs. Herbert York,
physics director, Livermore Labo-
ratory, Livermore, Calif.

Glenn; - If you need a clipping service - I'm your man.

REPORT CARD

School Use of TV Questioned

BY DICK TURPIN, Times Education Editor

Increased use of educational closed-circuit television, estimated as aiding the educational pursuits this year of some 20,000,000 students throughout the country, was urged at two recent gatherings of educators.

The subject was a major topic at the Sacramento meeting last week which concerned itself with examining the teaching of science and mathematics in California schools. Discussions there and at an earlier conference in St. Louis pose the question, TV or not TV?

Not denying its great possibilities, we wonder about incorporating television techniques to eliminate books from libraries with films, microfilm and taped recordings.

We also wonder if it would be as much fun for the student body to watch sports events from the classroom instead of the basketball court or to go on a field trip via a remote TV unit at a museum or zoo.

This may be the picture of the shape of things to come but such all-pervading uses of the TV camera may make it an unwelcome medium.

A conservative note comes from two sources, the National Education Association and Human Events, a weekly published at Washington, D.C.

The NEA reports that a study classifies nine of 10 classroom teachers in a 3000-teacher sampling as neither "progressive" nor "traditional," but rather as "partly both." Six per cent asserted progressive teaching tendencies and 3% leaned toward the traditional.

An item in the weekly, referring to 200 studies of student beliefs made for a forthcoming book, notes that this is a conservative generation, bending more to the right, where government and business are concerned, than their elders.

One phase of the adult education program is not under attack from any corner in the present Board of Education deliberations on its fiscal budget. That is the program devoted to classes in citizenship and English for the foreign-speaking.

Between 1500 and 2000 aliens come to Los Angeles every month and one of their first acts is to sign up in these classes. This is the initial step toward obtaining citizenship and, the schools report, 200 certificates of course completion are issued each year.

The program has a far-reaching family effect, too, according to educators. They say many juvenile delinquency problems arise in homes where the parents have no speaking knowledge of English.

Plutonium, the atomic energy fuel which comes from synthetic elements, might never have been discovered, or at least not yet, if it hadn't been for a science teacher long ago at Jordan High School.

In his class then was a gangling, Lincoln-esque pupil named Glenn T. Seaborg. Something the teacher said, some tiny spark, stimulated Seaborg and opened his youthful eyes to the wonders of science.

Today he is Dr. Seaborg, associate director of the Radiation Laboratory at the University of California and professor of chemistry, who won a Nobel prize in 1951 for his work in finding the element. This is the type of stimulation Dr. Lee A. DuBridge of Caltech is always preaching for education.

California is a leader in scholastic boondoggling and educational nonsense, charges the critical Council for Basic Education from Washington, D.C.

The CBE cites as educational malpractice scholastic credit for youths working as box boys in supermarkets and a class in bachelor living, both in unnamed California high schools.

For those who feel that all problems in education are fiscal, the CBE adds, it cannot be. This, it said, is because the Golden State is right near the top in teacher salaries and amount spent each year per pupil.

Note of frustration from Pomona: Plans to admit girls to the California State Polytechnic College next fall have been canceled.

A shortage of facilities caused by unavoidable delays in construction and a prospective 60% increase of male students forced the decision.

So, of the 250 girls who had applied for admission, not one will be among the 1200 students on campus next fall.

10,000 MEET

Educators Open S.F. Convention

Oakland Tribune 2/8/58

Some 10,000 educators from all parts of the Nation, affiliated with a score of separate organizations, are holding conventions in San Francisco today, and the crisis in U.S. public schools is their chief concern.

The main body of visitors—5,000 school superintendents—open a four-day meeting with searching discussions dealing with the controversy that has arisen throughout the country over the quality of our basic educational standards in the nuclear-fission-and-space age.

Dr. James B. Conant, president emeritus of Harvard University and former ambassador to Germany, is scheduled to address these members of the American Association of School Administrators tonight.

U.C. MEETING CLOSES

Meanwhile, a two-day joint session of the American Educational Research Association and the California Educational Research Association closes today with talks by Dr. Glenn T. Seaborg of the University of California, and Dean Asahel D. Woodruff, of the College of Education, Brigham Young University.

Dr. Seaborg, Nobel Prize-winning U.C. physicist, was to speak at a luncheon meeting on "The Crisis in Science and Education." This afternoon's topic by Dr. Woodruff has "Educational Research and the Curriculum."

San Francisco's program of teacher training for college graduates came under special scrutiny at yesterday's meetings of the two research groups. This is the fellowship project through which 30 selected candidates each year receive college tuition and registration fees, plus \$125 monthly for subsistence, while taking post-graduate education courses.

Explanations of the program's functioning were presented by Mary C. McCarthy, director of the project for its sponsor, San Francisco Unified School District; Theodore F. Reller, of W. C., and Hilda Taba, of San Francisco State College.

Described as "a broadside attack on the problem of teacher shortage," the four-year-old program has given training to 85 persons, of whom 80 earned teaching certificates and 76 are now engaged in the profession, it was brought out.

COMMUNITY MIRROR

A good number of the school superintendents arriving for their convention expressed strong resentment of recent criticism leveled at the public education system.

Philip J. Hickey of St. Louis, association president, reflected

the sentiments of many when he pointed out that schools mirror the community, adding:

"The educational level of the parent in the community is not equal to the educational level of the child in school."

C. C. Trillingham of Los Angeles, president-elect of the organization, argued that the critics generalize too broadly.

"There are more than 50,000 separate school districts in the United States," he said. "Some schools are not doing too well, but others are doing a magnificent job."

Surveys show that parents of school children are more satisfied with educational methods than is the general public, declared Hobart M. Corning, of Washington, D.C.

INSPECTION URGED

"The public should go into the school and get rid of the misconceptions, vague notions and wrong ideas it has," he said.

Martin Essex, of Akron, O., insisted that so-called "progressive" techniques, widely criticized for replacing basic subjects with social studies and other marginal material, have never been adopted generally by the public schools.

Among the most outspoken of the visitors was Finis E. Engleman, Washington, D. C., who assailed the critical views of U.C. Prof. Joel Hildebrand and Prof. Arthur Bestor, of the University of Illinois.

"They have used half-truths and implications," Engleman charged. "About half of their criticism has been false."

Seaborg Says Voters Don't Care Much About Schools

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Dr. Glenn T. Seaborg, associate director of the University of California Radiation Laboratory, made the appeal at a joint meeting of the California Educational Research Association and the Western Division of the American Education Research Association in the St. Francis Hotel.

"People must somehow be jarred out of the comfortable complacency that America will always lead the world in science and in commercial productivity and that our standard of living and national security are assured by the system as it stands," he said.

"In spite of the overwhelming case for the importance

shows that public concern in these matters is not high."

Seaborg said one of the biggest obstacles to achieving an improved school system is "the matter of teachers' salaries."

"Electricians, plumbers, auto workers and railroad conductors and engineers earn more than teachers," he declared. "Considering the depreciation of the dollar, the real income of the teacher has actually fallen since 1940."

Mentioning that "thousands" of teachers leave the profession "because they simply cannot support their families in any decent standard of living on the pay they receive, Seaborg said it was "pure fantasy to believe we can bring about any real change in our school system without a drastic change for the better in the economic incentives for teachers."

The group addressed by Dr. Seaborg was one of various educational bodies meeting here in conjunction with the American Association of School Administrators, with sessions scheduled through Tuesday.

RESEARCH ROLE

The role of educational research in school improvement was analyzed by three educators in the closing panel discussion of the joint meeting. They were Dr. Asahel D. Woodruff, dean of the Brigham Young University College of Education; Dr. Virgil E. Herrick, president of the American Educational Research Association, and Dr. I. James Quillan, dean of the Stanford University School of Education.

Woodruff said research should more closely relate the objectives of education with curriculum planning, decrease emphasis on the teaching methods and increase emphasis on subject matter.

Quillan called for increased educational research in the "sequence and continuity" of subjects from kindergarten through college, and said that one of the important goals of education is to develop sustained interest in learning beyond "formal classroom education."

He challenged the "uniformity" of schools. Some subjects deserve only one-half hour while others may require two hours of concentration at a time, he said.

And he cautioned that the role of television in education is only a "symptom" of new things to come in teaching methods. Use of TV in the classroom, he said, "will require careful and objective study."



DR. SEABORG
A look at the public

of science, upon which our very future existence depends, there is much evidence that the public has not yet caught on to the gravity of the situation," he said.

"The discouraging results of recent school tax elections in the Bay Area communities

Tougher School Courses Urged

Harvard President Emeritus Cites Need for Better Education

Dr. James B. Conant, president emeritus of Harvard University and former U.S. ambassador to Germany, urges "a tough program for able students in American high schools."

Conant addressed 5,000 persons last night at the Western conference of the American Association of School Administrators in San Francisco Civic Auditorium, and Dr. Glenn T. Seaborg, Nobel Prize winner and associate director of the University of California Radiation Laboratory, told the convention that "America's success in solving the school crisis will have much to do with its success in remaining a world power."

Seaborg said that the "discouraging results" of school elections in Oakland and other Bay Area communities show that "the public concern in these matters is not high."

Conant said that 15 to 20 per cent of all students on the national average "should be so challenged by their courses, that they would be doing 15 to 20 hours of significant home work each week."

He continued:

"All of them should acquire something like a mastery of at least one foreign language, which will require at least three years of hard work."

"All of them should have completed at least three years of mathematics (and many four)."

"All of them should have taken either physics or chemistry or both, as well as a course in biology. Good counselling will see to it that those in the physics class are well prepared in mathematics and hence the physics teacher will not have to face the almost impossible task of teaching this subject to those who have only studied one year of algebra."

Conant said the rest of the student body in high schools generally either doesn't know all — and hence doesn't elect what it wants to do eventually — or is the type that comes from a predominantly industrial or agricultural area and hence is more interested in vocational training.

The exceptions, he said, are the 2 or 3 per cent of unusually gifted students who would be greatly challenged and benefited by a tough course for the upper bracket of able students.

WATCH TALENTED

Conant proposed that academically talented or able students be identified by the time they leave the eighth grade and that records be kept through high school of the extra training in various courses they pick up through the tougher program he proposed.

He said constant guidance should be provided to make the most of each student's aptitudes and that the results be published in round figures as each class graduates.

Seaborg declared:

"People must somehow be jarred out of the comfortable complacency that America will always lead the world in science and in commercial productivity and that our way of living and national security are assured by the system as it stands."

PUBLIC IN DARK

"In spite of the overwhelming case for the importance of science upon which our very future existence depends, there is much evidence that the public has not yet caught on to the gravity of the situation."

Then Seaborg went into the results of local school tax elections, saying that this indicates the public does not understand the situation.

One of the biggest obstacles to achieving an improved school system "is the matter of teachers salaries," Seaborg went on. "Electricians, plumbers, auto workers and railroad conductors and engineers earn more than teachers," he said. "Considering the depreciation of the dollar, the real income of the teacher has actually fallen since 1940."

ECONOMIC PROBLEM

"It is pure fantasy to believe we can bring about any real change in our school system without a drastic change for the better in the economic incentives for teachers."

Today the administrators will hear talks by the Rev. Robert E. Richards, 1952 and '56 Olympic pole vault champion, and Sen. Frank Church, Idaho.

In the afternoon they will participate in section meetings in which small groups will discuss a multitude of topics, ranging from "The High School in a Changing World" to "Practical Solutions to Discipline Problems."

EASTBAY DELEGATES

Many Eastbay high school and college educators are taking part in the section meetings. Carl B. Munck, a member of the Oakland Board of Education, will also take part in Monday night's general session. As first vice president of the National School Boards Association, he will bring greetings to the administrators.

The association has more than 11,000 members and it holds three regional meetings plus its Atlantic City national convention every year.

Delegates to the San Francisco meeting come from 12 western states, Alaska, Samoa, Guam and Hawaii.

SERVICE AWARDS

Awards for distinguished service in school administration were given Clyde U. Phillips, former superintendent of schools at Hays, Kansas; and to Samuel E. Fleming, former superintendent of schools at Seattle, Wash. at last night's opening session.

Other speakers who will appear at general sessions include Frances P. Bolton, member of Congress from Ohio; Benjamin C. Willis, superintendent of schools in Chicago; and Arthur F. Corey, state executive secretary of the California Teachers Association.

Association president Philip J. Hickey of St. Louis will introduce new officers including his successor, C. C. Trillingham, superintendent of Los Angeles County Schools.

More than 100 exhibits of school equipment, classroom tools and teaching aids will also be displayed at the Civic Auditorium.



Left to right: Virgil E. Herrick, president of the American Educational Research Association; Dr. Glenn T. Seaborg of UC, and Jack A. Holmes, president of the California Educational Research Association.

S.F. Chronicle

3/9/58

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US Jaycees

3/24/58

Will Honor

Dr. Seaborg

Dr. Glenn T. Seaborg, noted scientist and Nobel Prize winner, of the Radiation Laboratory, University of California, will receive a certificate of appreciation from the United States Junior Chamber of Commerce Wednesday evening at the Claremont Hotel.

The local chapter of the national organization, the Berkeley Junior Chamber of Commerce, will represent the US Jaycees and Berkeley Jaycee President Norman R. Williams will make the presentation on behalf of Charles E. Shearer Jr., president of the US Junior Chamber of Commerce.

The presentation is being made to Dr. Seaborg for his services as a judge in selecting the Nation's "Ten Outstanding Young Men of 1957." The 10 outstanding young men were honored at a banquet in Phoenix, Ariz., last January. Dr. Seaborg was a recipient of one of America's 10 outstanding young men awards in 1947.

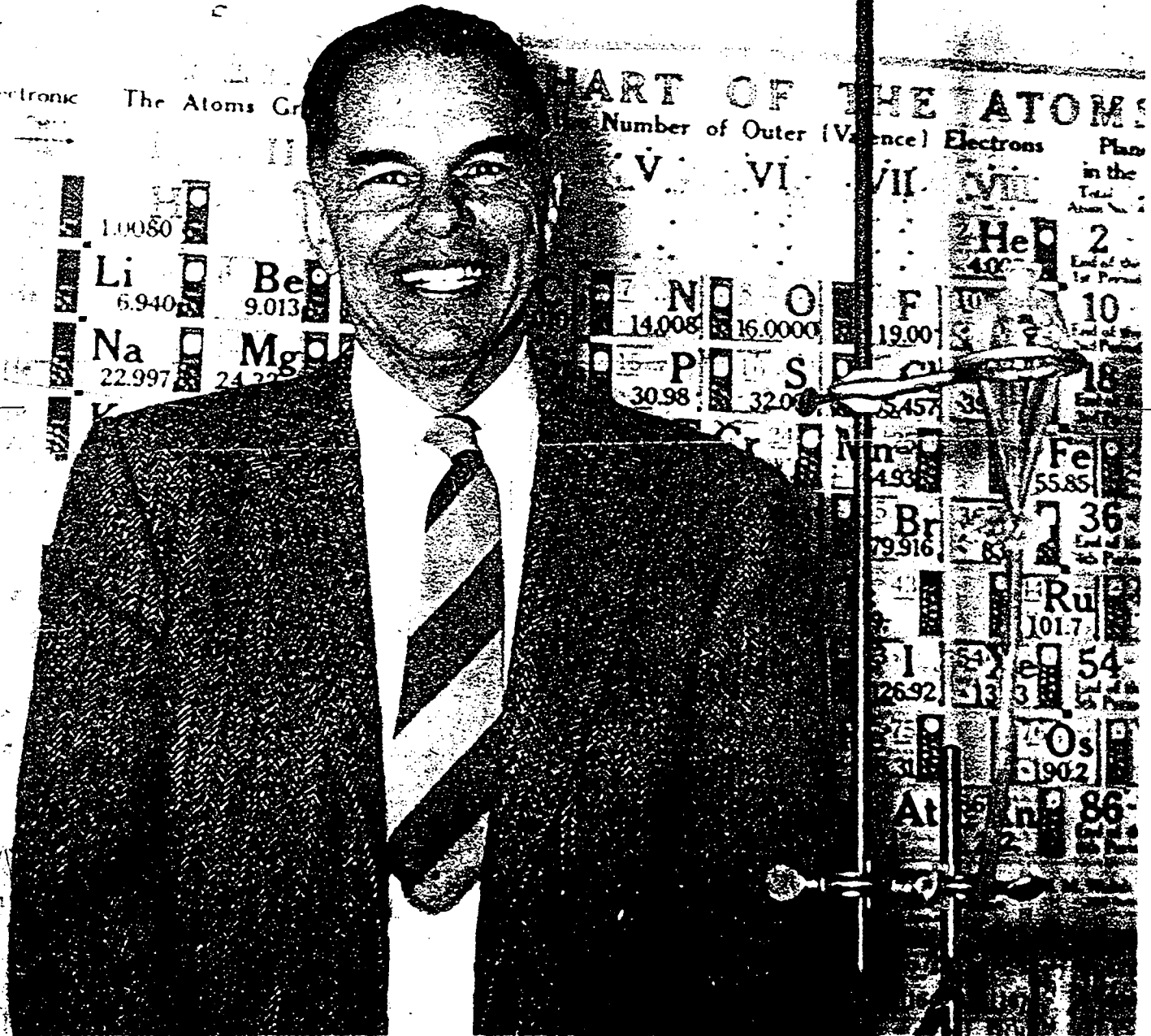
As one of a panel of 10 judges in this year's selection he served with Dr. Herman B. Wells, president, Indiana University; Dr. Frank Murphy, chancellor, University of Kansas; US Sen. John F. Kennedy, Massachusetts; Gov. Joseph Foss, South Dakota; Robert Ingersoll, Borg-Warner Corp.; Phillip Talbott, president, Chamber of Commerce of the United States; Richard S. Morse, president, National Research Corp.; Dr. Robert A. Hingson, Western Reserve University, Lakeside Hospital; Arthur Schlesinger Jr., department of history, Harvard University; W. Roy Wayland, Valley National Bank, Phoenix, Ariz.; George F. Miller, Boy Scout executive, Phoenix, Ariz., and L. Eugene Root, Missiles System Division, Lockheed Aircraft Corp.

Parade

Experts answer a far-reaching question

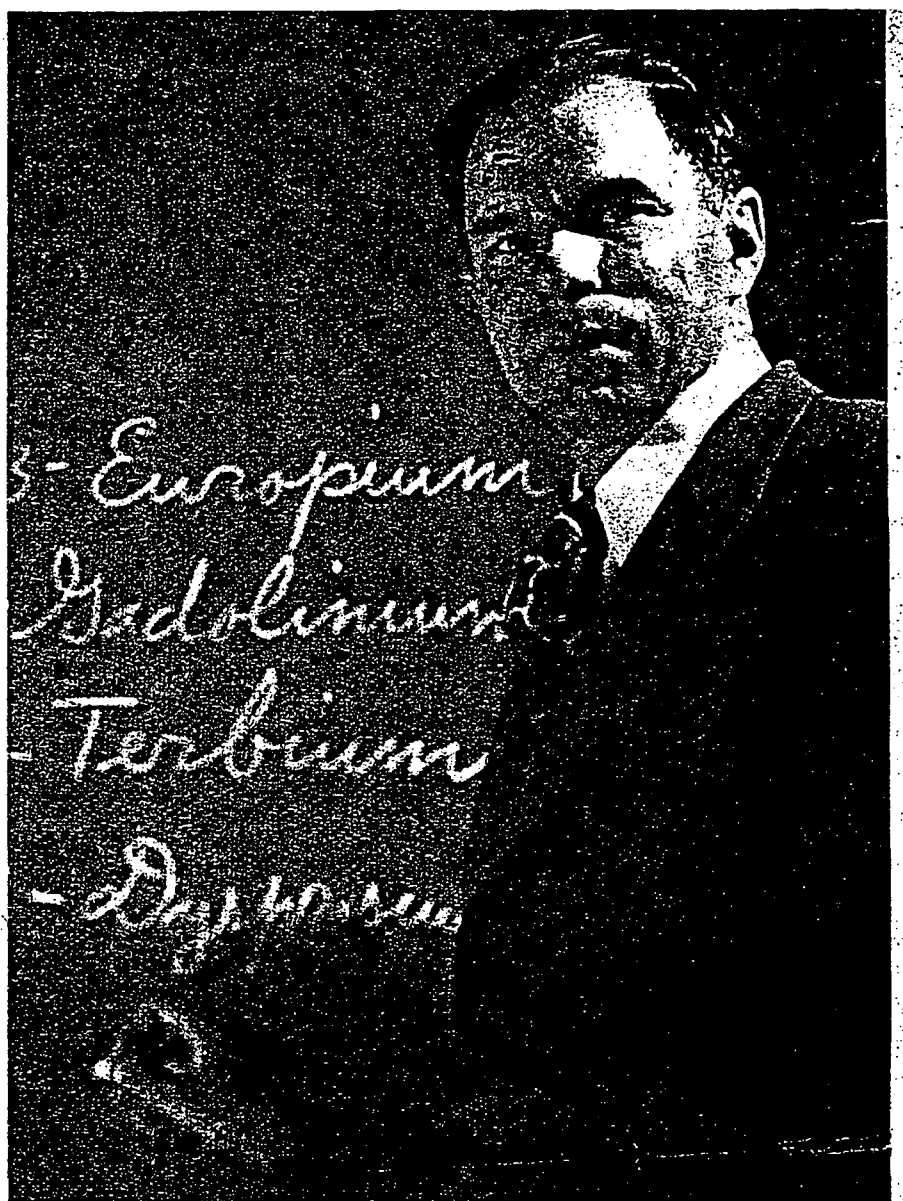
'Doesn't anyone work hard any more?'

ALSO: The Parade All-America High School Basketball Team... Why Hollywood kids 'go bad'



March 30, 1958
REG. U.S. PAT. OFF.

GLENN SEABORG: A scientist you should know see page 4



A scientist you should know

Dr. Glenn Seaborg (above and front cover) is a man of tremendous importance in your life — but, because he is a scientist, you may never have heard of him. PARADE believes it is time America knew its scientists as well as it does its movie, TV and sports stars. Today, read the first of a series of articles on these men who are changing the very world we live in. It was written by Lloyd Shearer, PARADE West Coast correspondent. It appears on page 6.

Dr. Seaborg is a Nobel Prize winner—and a golfer

BERKELEY, CALIF

YOU MAY NEVER have heard of Dr. Glenn Seaborg — but in 1951 he shared the Nobel Prize for chemistry. He has written 160 scientific papers on nuclear chemistry and physics. He is co-discoverer of the important fissionable isotopes uranium 233 and plutonium 239 (which made the first atomic bombs possible), as well as the transuranium elements plutonium, americium, curium, berkelium, californium, einsteinium, fermium and mendelevium.

Dr. Seaborg also is a professor of chemistry and associate director of the Radiation Laboratory of the University of California here. Yet he remains rather less well known than, say, Jayne Mansfield. For one reason, he looks different: he is 6'3", 170 lbs., balding around the forehead and generally self-effacing. For another, he lacks a posse of press agents to bombard the public with his virtues and accomplishments.

In the world of science, however, these last loom gigantic. At 45, Seaborg is regarded as a brilliant and personable scientific pioneer of the atomic age. He is so knowledgeable about radioactive elements and mixes so well with men of every stripe that he frequently is pressed into service by the White House. For example, he was a Presidential appointee to the Atomic Energy Commission's general advisory committee and a technical adviser to the U.S. Delegation at the Geneva Conference on Peaceful Uses of the Atom.

The Plutonium Challenge

He is best known for his discovery in 1940 of plutonium (element 94) and the other elements heavier than uranium. The importance of plutonium became apparent during World War II when it was found that one of its isotopes was fissionable. This meant it could be used as a source of atomic power if 1) it could be produced in sufficient quantity, 2) its chemistry could be determined and 3) a way could be found to separate it from uranium and the fission products.

In 1942 Seaborg was loaned to the Government and assigned to the Manhattan Project, where our leading scientists were trying to develop an atomic bomb. Seaborg was



SEABORG AND WIFE: When they were wed in 1942, she was secretary to Dr. Ernest Lawrence, director of California U.'s Radiation Laboratory.

given the job of working out the complete chemical process for the separation of plutonium produced in the chain-reacting piles from the mixture of uranium and intensely radioactive fission products at Oak Ridge, Tenn., and Hanford, Wash.

At the time, responsible scientists said it was impossible to learn enough about the chemistry of plutonium to design a separation process in less than five years. Seaborg designed the process and put it into practice in a little more than a year. Three years after Seaborg went to work in Chicago, atomic bombs were being made from plutonium. The atomic bomb dropped on Nagasaki was a plutonium bomb.

Since then, nuclear chemistry under Seaborg's leadership has been revolutionized. Whole new branches of methodology and instrumentation have been pioneered. Radiation detection and measuring instruments have been refined. New uses of high-energy accelerators and nuclear reactors have come out of his laboratory.

Seaborg is hardly the layman's idea of a scientist. Neat, rugged, modest, he likes golf — and people. "The popular notion that sci-

entists are a strange, impractical breed," he says, "couldn't be more wrong. What we have to do is improve our educational system to the point where people place more value on scientists. Instead of being denounced as 'egg-heads,' they should be looked up to for their intellectual achievements. One of the major faults in our society today is that we tend to equate money with merit."

A Teacher Inspired Him.

Seaborg was born in the mining town of Ishpeming, Mich. but reared in Southern California. "I was inspired to major in science," he says, "by a wonderful high-school teacher, Dwight Logan Reid. He taught chemistry so fascinatingly that I decided to devote my life to it. I'm certainly glad I did."

Recently Jayne Mansfield was paid \$25,000 a week to appear in Las Vegas and sing a song. Seaborg has never received that much salary a year. He could use it — he and his wife, the former Helen Griggs, have five children, ranging from 3 to 11.

Does he resent the existence of people like Jayne Mansfield? "Not at all," Seaborg smiles. "Scientists are human. They admire sex appeal, too."

At 45, Seaborg is relatively young as scientists go, and his greatest scientific achievements may well lie ahead. Bear in mind the name — Glenn Seaborg.

2 Scientists Warn U.S., 'Stay Strong'

By RAYMOND LAWRENCE

ASILOMAR, April 19—A famous American physicist from the University of California counseled America to maintain its military offensive capability. A noted atomic medical authority advised on the tolls that may be expected if this military strength results in another World War. The former was Glenn T. Seaborg, Nobel Prize winner and co-discoverer of plutonium, and the latter was Dr. Stafford Warren, dean of the UCLA Medical School and one of the pioneers in the field of atomic medicine. Dr. Warren advocated continuance of atomic tests because they will help establish patterns of civil defense protection.

12TH ANNUAL PARLY

These addresses were made at the 12th annual conference of the World Affairs Council, which opened here yesterday with an attendance of 800 persons from various parts of Northern California.

Dr. Seaborg emphasized the need to perfect the ICBM and "all the Buck Rogers array of modern weaponry."

"Cultural exchanges," he said, "such as have been encouraged by the Administration in recent months are very heartening and should be strongly supported."

He declared "We should aim for a really massive exchange of visitors, students and trainees—numbering in the tens of thousands at least." And he believes that the Soviet government would agree to such a program.

Speaking on the contributions of atomic energy to medical and biological problems, Dr. Warren pointed out that of the million persons connected with the Manhattan Project of the last war, with which he was connected, only two individuals suffered any accidents as a result of radioactivity.

CONTINUE TESTS

Tests of nuclear weapons should be continued by the United States, according to Dr. Warren, until the best authorities of the Atomic Energy Commission decide that the levels of radioactivity are dangerous.

One of the principal points of civil defense is that we need information about winds and fallout of radioactive material in order to determine how our people can survive, Dr. Warren pointed out. If tests are not continued, these problems of survival cannot be solved. Thus, he concluded, we may be glad that the Russians excelled us in the original experiments on space travel.

The main features of the conference appear on tonight's program when the delegates hear Dr. Henry A. Kissinger of Harvard University, who was one of the main authorities of the Rockefeller Report on nuclear energy and our national security, and Dr. Willard F. Libby, the scientific member of the Atomic Energy Commission.

Seaborg Talks on A-Power

By Hale Champion

ASILOMAR, April 18—

The United States is still "far in front" in industrial applications of nuclear energy, Dr. Glenn Seaborg, Nobel laureate in chemistry from the University of California, said here tonight.

Speaking to the opening session of the annual three-day conference of the World Affairs Council of Northern California, Seaborg said Great Britain has built more large-scale plants only because of a different approach.

Seaborg, also an adviser to the Atomic Energy Commission, said Great Britain has been forced to "launch a major effort" with a "relatively unsophisticated reactor design" because of economic circumstances.

U. S. POSITION

The U. S., with much lower electrical costs and much less dependent on Middle East oil, has been in a position to continue an experimental, broad-scale development program without "plunging headlong" into nuclear power construction, he said.

Britain is second to the U. S. in over-all capacity, however, Seaborg said, with the Soviet Union, Canada and France rounding out the "nuclear big five."

He said Russia's nuclear power construction is "unknown, but apparently only moderate."

Within the U. S., Seaborg noted, the trend is toward

more, not less, government participation.

"Private corporations now have much more nuclear experience that they did in 1955," he said, referring to the expectations of the Geneva conference on peaceful uses of the atom and the fact that a new conference will review progress in Geneva this fall.

"This experience has greatly tempered the easy optimism with which many of them entered the field. The nuclear fallout of companies dropping out of the field has been heavy during the last year. Those which remain are now convinced of the necessity for massive amounts of development work with Government funds and perhaps an operating subsidy for years," he observed.

Seaborg also called for a "direct attack on our differences of opinion" with the Soviets by a "more intimate contact" with them.

He said he spoke not of "summit meetings" but "a really massive exchange of visitors, students and trainees—numbering in the tens of thousands, at least."

INFLUENCE

Seaborg said "I am convinced that the presence of thousands of intelligent Russians with some personal knowledge of America and the Western World would have a steady influence for the better on the official policies of the Soviet Union."

The University of California is beginning to get applications from Yugoslavian,

Polish and Czechoslovakian students, said Seaborg, "and it is taking some hard work to convince the authorities that these individuals can be allowed to come to Berkeley without constant surveillance

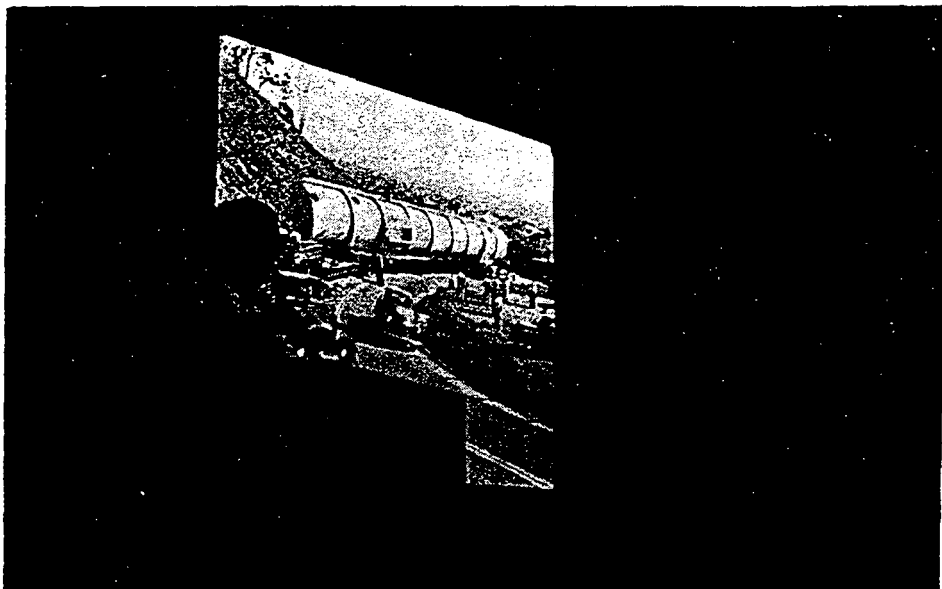
which, of course, we refuse to provide."

He added: "Of course, if they cannot come here they can always go to Moscow University."

The theme of the conference is "The International Atom-Impact of Nuclear Energy on World Affairs."

NEWS FOCUS

TIGHT TURN. At the Chemical Education Division Symposium on the New Elements, Glenn Seaborg shows how part of the equipment for University of California's bevatron was moved to Berkeley. Earlier, B. B. Cunningham provided the high point of the symposium when he revealed that the university has isolated a measurable amount of berkelium



Berkeley Gazette
Memorial to
J. W. Kennedy
4/30/53

Dr. Glenn T. Seaborg, professor of chemistry at the University of California and Nobel Laureate, tonight will deliver the first Joseph W. Kennedy Memorial Lecture at Washington University in St. Louis. He will speak on the synthetic heavy elements.

Dr. Kennedy, who died last year, was one of the Nation's most brilliant nuclear chemists, and a former associate of Dr. Seaborg. Seaborg, Kennedy and A. C. Wahl were co-discoverers in 1941 of element 94, plutonium, an ingredient of atomic bombs.

Dr. Kennedy received his PhD in chemistry in 1939 at the University of California, was a member of the faculty from 1939-43, headed the chemistry division at Los Alamos from 1943 to 1945, and joined the Washington University faculty in 1946, later becoming chairman of the department of chemistry.

Berkeley Gazette

UC Finds Heaviest Element

5/5/58

A top-level University of California nuclear scientist today announced the "definite discovery" of the heaviest element on record and at the same time challenged the findings of an international group which last year said it did approximately the same thing.

The element is nobelium, No. 102 in the roster of chemical elements. It is the tenth element heavier than uranium to be made by man. Uranium, No. 92 on the list, is the heaviest of the elements found in nature.

A tense 24-hour stretch of work with a new type of atom smasher at the University of California April 18 yielded the new results. They were reported in Galenbourg, Tenn., in a paper before the Conference on Reactions Between Complex Nuclei by Dr. Albert Ghiorso.

Dr. Ghiorso spoke for a team of Berkeley scientists, including Dr. Glenn T. Seaborg, Nobel Prize winner; Torbjorn Sikkeland, Norwegian nuclear researcher, and John R. Walton, Berkeley research chemist. These four comprised the Berkeley discovery team.

BASIC MATERIAL

The Berkeley group used curium 246, one of the various forms of element 96, as the basic material for producing the new substance. They bombarded this with the nuclei of carbon atoms, using both ordinary carbon 12 and carbon 13, which is a heavy variety.

Out of this, they said, they got a variety of element 102, or curium 254. This new material, they added, is so radioactive that it decays into fermium or element 100 in a few minutes. The rate of decay or half life is three seconds.

Because the decay rate is too fast to permit direct chemical identification, Dr. Ghiorso said, the team used an indirect method. It measured the amount of fermium, the decay product, and from this deduced the presence of nobelium 254.

Last July an international team of researchers said they observed nobelium 252, a twin of nobelium 254, after bombarding curium 244 with carbon 13 in a cyclotron at the Nobel Institute of Physics at Stockholm. Scientists of the British Atomic Research Establishment at Harwell, England, and the Argonne National Laboratory at Chicago participated.

'UNSUCCESSFUL'

Dr. Ghiorso said the Berkeley group tried to duplicate the Stockholm experiment, using the same kind of curium and with a much more intense bombardment with carbon but were unsuccessful.

Dr. Paul Field, Argonne staff physicist who participated in the Stockholm experiment, said in Chicago that, although he has not seen data on the Berkeley process, "our own data looks good."

Meanwhile, in Stockholm, Sweden, members of the Swedish group of the international research team which last Summer announced discovery of the new element nobelium said they expected their findings would hold good in future tests.

They noted, in a joint statement, that different methods had been used at Berkeley and at the Stockholm Nobel Institute for Nuclear Physics and that this might explain any discrepancies.

They added that a series of new experiments are planned with the Stockholm cyclotron under somewhat different conditions, which might yield more conclusive results.

UC TEAM PRAISED

The Stockholm group said it was "impressed by the ingenious technique used by the Berkeley team and the nice results obtained."

"We have no doubts about the accuracy of the Berkeley findings," the scientists added.

The international team which announced the discovery of nobelium here last July consisted of Drs. Hugo Atterling, Wilhelm Forsling, Lennart Holm and Bjorn Astrom, all of the Nobel Institute for Nuclear Physics, Dr. J. Milsted of the Harwell Atomic Research Center, Britain, and Dr. Fields and A. M. Friedman of the Argonne National Laboratory in Illinois.

5/5/58

Heaviest Element 'Definitely Found'

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Speaks for Berkeley Team

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Dr. Seaborg has participated in the discovery of all the elements heavier than uranium. Dr. Ghiorso has taken part in some of the previous discoveries.

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The international group said they observed small amounts of Element 102 activity in 12 out of 50 tests, and that it had a half life or decay period of 10 minutes.

Dr. Ghiorso said the Berkeley group tried to duplicate the Stockholm experiment, using the same kind of Curium and with a much more intense bombardment with carbon but were unsuccessful.

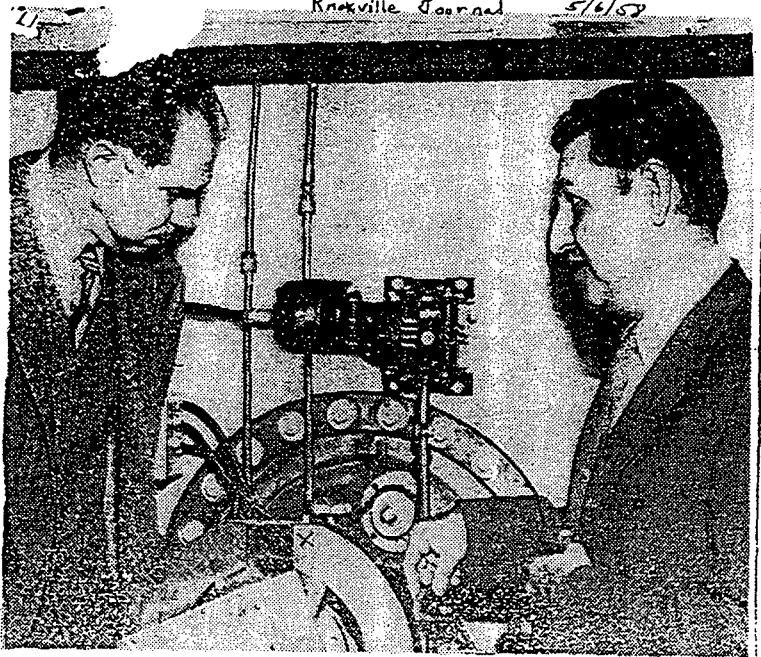
The attempts to produce Element 102 by the Stockholm procedure were put down carefully and repeated many times, using a wide range of energies behind the carbon projectiles, Dr. Ghiorso said.

Chicagoan Comments

Dr. Paul Field, Argonne staff physicist who participated in the Stockholm experiment, said in Chicago that, although he has not seen data on the Berkeley process "our own data looks good."

He said that there will be attempts to repeat earlier results in the Swedish cyclotron, but there will be some delay because the machine is not operating currently.

"Our identification was made by direct chemical separation of the element," Field said. "Apparently the Berkeley team observed only the daughter—the decay element. There is some discrepancy. We'll try to determine where it lies."



CLAIM HEAVIEST ELEMENT DISCOVERY—Dr. Glenn T. Seaborg, left, and Dr. Albert Ghiorso, right, are members of the Berkeley, Calif., science team of four credited with the "definite discovery" of Nobelium, No. 102, heaviest element on record. Dr. Ghiorso, who made the announcement at Gatlinburg, challenged, at the same time, the findings of an international group which last year said it made approximately the same discovery. Seaborg and Ghiorso are shown last year with atom smasher called the "Hilai." (AP Wirephoto).

S.F. Chronicle
5/14/58

Scientists Dispute Over New Element

By Associated Press

A team of University of California scientists yesterday announced the "definite discovery" of the heaviest element on record.

Dr. Albert Ghiorso, representing the Berkeley researchers, announced the discovery of nobelium, No. 102 in the roster of chemical elements, to the Conference on Reactions Between Complex Nuclei at Gatlinburg, Tenn.

The conference is sponsored by the Atomic Energy Commission.

HEAVY ELEMENTS

Nobelium is the tenth element heavier than uranium to be made by man. Uranium, No. 92, is the heaviest of the elements found in nature.

In announcing the discovery, Ghiorso also challenged the findings of an international group last year which said it had done approximately the same thing.

Ghiorso spoke for a team of scientists including Dr. Glenn L. Seaborg, Nobel Prize winner; Torbjorn Sikkeland, Norwegian nuclear researcher, and John R. Walton, Berkeley research chemist.

The scientists made their discovery on April 18 using

an atom smasher on the Berkeley campus.

EARLIER REPORT

Last July an international team of researchers said they observed small amounts of element 102 in tests at the Nobel Institute of Physics at Stockholm.

Ghiorso said the California

group had attempted unsuccessfully to produce nobelium by duplicating the Stockholm experiment.

At Chicago, a physicist who took part in the Stockholm test said he hadn't seen information on the California process, but added: "Our own data looks good."

Dr. Paul Field of the Argonne National Laboratory staff said, "Our identification was made by direct separation of the element. Apparently the Berkeley team observed only the daughter—the decay element. There is some discrepancy. We'll try to determine where it lies."

Five Bay Area Scientists Named To Academy

Five Bay Area professors were elected to the American Academy of Arts and Sciences at the group's annual meeting in Boston yesterday.

The academy lists as members some 1300 intellectuals in all disciplines.

The professors are: Luis Walter Alvarez, University of California, Berkeley, physics; Melvin Calvin, University of California, Berkeley, chemistry; Ernest Ropiequet Hilgard, Stanford University, experimental psychology; Kenneth S. Pitzer, University of California, Berkeley, chemistry; and Glenn Theodore Seaborg, University of California, Berkeley, chemistry.

U.S. School System Below Par, Dr. Glenn Seaborg Says

Dr. Glenn T. Seaborg said today America's educational system isn't good enough and consequently "we are paying a high price for our scientific illiteracy."

Seaborg, associate director of the University of California radiation laboratory at Berkeley, told a San Francisco State College commencement audience that practically all aspects of life are based on a scientific and engineering technology.

He urged increased, but not one-sided, emphasis on mathematics and science, adding: "Our goal should be a broad and balanced education for every American boy and girl

... we need people who can think."

The Nobel prize winner also called for "a much larger federal aid program" to speed needed changes in American education.

He declared that "even now there is no concerted movement to improve the financial and social status of the teacher, who is the key to the solution of this problem."

Seaborg said the teacher shortage will force bold experimentation with new teaching techniques.

San Francisco State President Glenn S. Dumke conferred degrees on nearly 1,800 persons.

Oakland Tribune 6/7/58

Big Education Push Urged by Seaborg

Dr. Glenn T. Seaborg, Nobel Prize winner, urged here yesterday a "much larger Federal aid program" to speed changes in an educational system that is "not good enough for today."

The University of California nuclear scientist spoke at the commencement exercises at San Francisco State College.

"The clamor throughout our Nation for improvement in education has not yielded the changes and results that are so badly needed," he declared. "Even now there is no concerted movement to improve the financial and social status of the teacher, the key to the solution of this problem."

WHERE'S SUPPORT?

Seaborg said that increased local and State financial support was not only slow in coming but it appeared "a dubious assumption that it is coming at all."

"I believe that the needed improvement cannot come without a much larger federal aid program than has so far been proposed by the Administration."

He said ways could be found to apply such aid "without endangering the proper local control of schools and colleges."

Seaborg urged greater emphasis on mathematics and science in a world where "practically all aspects of life today are based on a technology advancing at an explosive rate," but he warned against making it one-sided.

"We should not aim to make every intelligent American youth into a nuclear physicist or a rocket-fuel chemist; we should not engage in an all-out numbers race with the Soviet Union to see who can produce the greater number of engineers, and we should not so load the curriculum with math and science courses that those who do survive the training are lopsided and those who fail are unfit for anything else," he said.

He said the goal should be "a broad and balanced education for every American boy and girl capable of absorbing it."

"We need people who can think."

More than 1800 seniors and graduate students at San Francisco State were eligible for degrees, conferred by President Glenn S. Dumke.

Henry E. McGuckin Jr. of Quincy, graduating senior, spoke for the class of 1958 on the topic, "Partiality for Partisans."

This Week

MAGAZINE

NEW YORK
Herald Tribune



Special for Father's Day:

Biologist James Bonner and his children study butterflies on glass plate

How Scientists Teach Their Children Science

Page 8



Biologist: On our cover Cal Tech's James F. Bonner uses butterflies to teach children Pepe and Joey one scientific approach—learning by watching. Picture, shot through glass, shows Dr. Bonner pointing to butterfly egg. At egg's left are other growth stages — caterpillar, pupa and butterfly itself.



See Front Cover

How Scientists Teach



Jack Fields

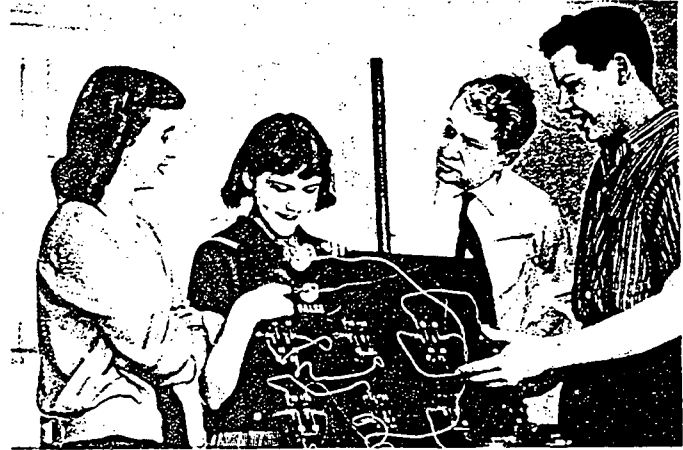
Antarctic Explorer: Dr. Paul Siple, scientific head of U.S. "Operation Deepfreeze" at the South Pole, uses glasses of water to teach daughters Ann, Mary and Jane about the properties of sound. The more water in glass, the slower sound waves travel through it — making a deeper musical tone



Atomic Physicist: Robert Moon built University of Chicago's history-making cyclotron, used in first sustained atomic reaction. Here he teaches Julia, Peggy and Bob how to reason with homemade "logic-board." Another favorite "learning-aid": the Bible — which teaches "revelation of truth through faith"



Joe Covello



Arthur Shay

Their Children Science

Here are six good ideas for every father raising youngsters in a scientific age. They add up to a home-education program that's both invaluable and fun — and Father's Day is a good time to start!

By MARIANNE BESSER

"America needs scientists." You've been hearing that phrase ever since Sputnik I went into orbit last October. You're going to go on hearing it for some time to come. Estimates say the U.S. will need as many as half a million scientists by 1975.

Where are they all going to come from?

You might be surprised! Look around your own house and you're likely to see a future nuclear physicist or astronomer. Even more surprising, he will get his basic scientific training right at home.

This is because scientists require not so much a body of dry facts as a way of thinking — plus curiosity which children have an enormous supply of.

Will your child grow up to be a scientist? Not all will, of course, but all will have to live in an increasingly scientific age. So remember one thing when thinking about your child's future: in this era of expanding technology the scientist, far from being the bespectacled fuddy-dud of yesteryear, is today the man most likely to succeed.

Can you teach science to your kids? The answer is yes! You don't need special skills, expensive toys or even extra time. We asked some of the country's top men of science what they do about teaching their own kids. All their suggestions are simple ones any parent can adapt. The fact that many scientists teach their kids things far outside their own fields of specialization underlines how easy it is.

So why not use today, Father's Day, as a starting place — with these tips from scientists:

"You can learn from living things." California Tech's outstanding young biologist, Dr. James Bonner, feels that the study of living things is wonderful training for children as young as six or seven.

"In our family we have looked at butterflies and caught them and noticed that there are different kinds, and discovered that there are books with pictures and names of butterflies. We have talked about how butterflies come from caterpillars and that one doesn't have to take this on faith, but that one can catch a caterpillar and keep him on leaves in a cage and watch him pupate and come out a splendid creature. And we have gone even further and had our butterfly lay eggs on a leaf, watched the tiny caterpillars hatch out and grow

and ultimately turn into pupae, and then into adults.

"From this my children have learned that they can study any kind of living creature by watching it. I'd like to suggest that butterflies are very good for this purpose. Children like butterflies. They are easy to watch. They are interesting."

"You can learn from a garden." "Allowing children to have a garden of their own — or to help in growing plants in the family garden — is the best way to stimulate their interest in plants," says leading lady botanist Dr. Harriet B. Creighton. "In this way they become familiar not only with the plants, but with the insects and fungi which are pests.

"The real challenge is to stay ahead of our children," she adds.

"You can learn from special interests." An excellent way to teach new ideas is to capitalize on your child's special interests. This is especially good with high-school-age children whose interests are strongly developed. Dr. Paul Siple, the explorer whose work in "Operation Deepfreeze" in Antarctica is one of the major contributions to the International Geophysical Year, often uses this approach. He has three daughters: Ann — 17, Jane — 15, and Mary — 11.

"A few days ago Mary wanted me to illustrate some form of sound," he says. "She needed this information for a school project. I decided to use the girls' musical interest to illustrate my point.

"Do you remember the blind girl we saw on TV who played Christmas music on water glasses?" I asked Mary.

"Do you mean I should take a glass to school?" she answered, looking very excited.

"We went out to the kitchen and in a few minutes had tried out the tone of several glasses. Since adding water changes the tone of the glass, I asked Mary to see if she could match the glass with notes on the piano by varying the amount of water.

"This sounded like — Continued on page 40

Mathematician: MIT's Dr. Claude Shannon, internationally renowned for his contributions to "information theory," uses ping-pong ball to show Bernoulli's principle of physics to sons Bobby and Andy. When ball starts to fall out of airstream, increased velocity lowers pressure, forcing it back



Continued from page 9

such fun that her older sisters began to kibitz, and I explained to the girls that the added water lowered the tone because it slowed down the vibrations. 'Let's see,' I suggested, 'whether the encyclopedia can tell us how fast the glass vibrates to give off the tone.' Fortunately the encyclopedia didn't let us down.

"Of course," Dr. Siple adds, "there are quicker answers to a child's question, but I find that a bit of 'sugar coating' gets the information across well without anyone being the worse off."

"You can learn while you eat." You can teach science within the regular routine of your family life. The dinner table, or the ironing board, or dad's darkroom are all excellent places to have "science talks" with your children.

Dr. Glenn Seaborg, the young chemist co-winner of the Nobel Prize for the discovery of plutonium, finds the dinner table a good place to discuss science with his five children, ages 11, 10, 8, 6 and 3.

"We have a small — Continued on next page

Father-and-Son Space Map



You don't have to be a scientist to help your children get a start in science. **THIS WEEK's Key Map of Outer Space** (3'x2') and its Key Guide will answer many of their questions about astronomy and rocketry, space and satellites. Use the coupon below to send for your copy today. It's easy to understand — and you will love it, too.

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Physiologist: Columbia's Teru Hayashi helps children Tesa, Tomi, Tuck and Curt make a do-it-yourself-kit telescope. When kids finish grinding this four-inch concave mirror it will be powerful enough to let them view four moons of Jupiter



Maxwell Caplan

Fan The Spark Of Genius

copy of the periodic table of chemical elements on the wall near the dinner table," he says. "The children make attempts to identify the chemical elements by their symbols and numbers."

"You can learn in plain English." One of the busiest Americans today is Dr. Simon Ramo, Chief Scientist of the Air Force's Ballistic Missile Program and President of Space Technology Laboratories, Division of the Ramo-Wooldridge Corporation.

Dr. Ramo finds that he can teach his small boys difficult scientific theories usually reserved for college study by putting it into their language.

One instance involved the complicated concept of "information theory," that is, a way of measuring the amount of information in a statement or a photograph or in a TV talk. This is how he went about it:

"I asked Alan, when he was five, 'How many yes and no questions (like the 20 Questions game on radio) would it take to find out the age of a person who is anywhere from just born to 64 years old?' His answer: '64.' I then say, 'How can this be, since in the Twenty Questions game people find out much more secret things than age?' To this Alan replies, as might be expected: 'Those guessers are very smart.'

"Then I showed Alan that 'smartness' is not a mysterious gift but a way of thinking scientifically. I remarked that with one question I could cut down the number of possibilities from 64 to 32. 'Do you know what that one question is?' I ask. With this hint Alan gets pretty smart himself, and says: 'Oh yes. Are you old — more than 32? If you say "yes" then I don't have to guess about young ages, and if you say "no" I know I only have to guess about young ages.'

"So we went all the way down the line, until we had discovered together that we would only need six 'yes' and 'no' questions to get the right answer.

"It has been interesting to see Alan and Jimmie apply this basic scientific approach to their own learning efforts, even to their games. A great deal can be done in the home to teach this kind of scientific thinking,"

Dr. Ramo adds, "even if the parents are not scientists."

"You can learn on trips." A Sunday visit to a natural-history museum can be a real adventure into new discoveries for your child. Hermann Muller, Nobel prize-winning geneticist, says: "When I was seven my father took me to the American Museum of Natural History. By showing me the gradual change in the structure of the horse's hoof to adapt to faster running, he explained to me the principle of natural selection. From then on I could apply this idea to the diverse development in many living things."

You can also illustrate abstract ideas to older children on trips.

Cincinnati psychologist Lucien A. Cohen taught the concept of time to 12-year-old children by taking them to a factory to show how important timing was in making things. There they could see the abstract idea of time concretely in operation.

Some of these suggestions can be used just as they are, others will stir new ideas in your mind. Remember that you don't need to be a scientist to nurture one. For instance, atom-physicist Dr. J. Robert Oppenheimer discovered science at the age of five when his grandfather gave him a box of minerals.

Your children can also receive boxes of minerals, elements of paper making, fertilizer samples, and many other "Things of Science," through Science Service, 1719 N. Street N.W., Washington 6, D.C. This is a non-profit organization devoted to the popularization of science. For only \$5 a year, a kit with scientific specimens and experiments will come to your house once a month. They are very exciting and worth while.

And another famous scientist, Dr. Harold Urey, discoverer of heavy hydrogen, feels that many of our children are born with a spark of genius. "The number of geniuses is small," he says, "but the number of those with a spark of genius is much greater. This spark can be nurtured by parents, or it can be dulled and frustrated. What we should try to do is to nurture this key quality in our children." — The End

Berklium, Uclanium, Etc.

THE NEWS, as it touches upon Ronnie Knox, a sophomore football player, is bound to jar and disfigure the public conception of the scientist, particularly the nuclear scientist, and above all the nuclear scientist who wins a Nobel prize by rearranging atoms.

That kind of man, to carry any conviction at all to the average TV viewer, must be a dedicated laboratory hermit, possessing an absent and one-track mind, not knowing what day it is or caring what's for lunch.

Young Knox has now booted that popular notion clear out of the stadium, not by design, but by transferring abruptly from the University of California at Berkeley to the University of California at Los Angeles. The trip was illuminated by charges and countercharges concerning how he got to Berkeley in the first place and why he went back to Los Angeles in the second place; there is a suspicion that somewhere en route a rule or regulation of the Pacific Coast Conference may have suffered outrage.

It may now devolve upon Dr. Glenn T. Seaborg to sift the matter—the same Dr. Seaborg who is Professor of Chemistry at the University of California and who discovered five transuranium elements, plutonium, americium, berklium, curium and californium.

It is not because the Knox recriminations are flying around like neutrons in a synchrotron that Dr. Seaborg's services may be in order; it is because this world's foremost nuclear chemist is the U. C. faculty representative to the Pacific Coast Conference—being something of a sports fan. He plays golf, sneaks away from the lab to watch baseball games, and is the kind of football enthusiast who sometimes sits in the end zone the better to watch the line play.

Whatever the outcome, the public will be indebted to Ronnie Knox for showing it a Nobel Prize winner on his day off.

Dr. Seaborg Named U.C. Chancellor

Nobel Prize Winner To Continue Work In Radiation Lab

BERKELEY, July 19—Dr. Glenn T. Seaborg, a Swedish immigrant's son who once worked as a stevedore, is the new chancellor of the University of California Berkeley Campus.

The surprise appointment of the 46-year-old Nobel Laureate was announced yesterday by the University board of regents.

Dr. Seaborg will succeed Dr. Clark Kerr, who stepped up July 1 to become president of the University. Seaborg will continue as associate director of the U.C. Radiation Laboratory here.

Appointment of Seaborg and of Harry R. Wellman, professor of agricultural economics, as executive vice president of the statewide University were linked to the regents' approval of a \$59,106,190 capital improvements budget for 1959-1960.

17,000 MORE

The University, spokesmen said, must spend that minimum amount if it is to be prepared adequately, for the 17,000 additional students expected by 1962.

Among the expansion plans already approved are establishment of a new Institute of Technology at the site of the present Scripps Institute of Technology at La Jolla.

Dr. Kerr and Dr. Donald H. McLaughlin, new chairman of the Board of Regents, issued a joint statement declaring the new center may become the nucleus of a complete undergraduate and graduate campus for the San Diego area.

OAKLAND TRIBUNE

August 19, 1958
July

NOISY LOCATION

Dr. McLaughlin said the only serious problem which may prevent use of the La Jolla site as a new campus, competing in size with Berkeley and UCLA, is the nearby Miramar Naval Air Station.

"The noise level from jet aircraft is very high, and unless the situation can be corrected, it may prevent us from carrying out the full program there," he said.

In the \$55,106,290 capital expansion budget adopted during yesterday's meeting, the regents have allocated \$6,700,000 for new campus site acquisition, planning and development, and \$495,000 for plans and working drawings additional for the San Diego campus.

INSTITUTE SEPARATE

The U.C. Institute of Technology, Dr. Kerr explained, will be a separate program and will go ahead regardless of other factors. It will provide only graduate instruction and research in mathematics, physics, chemistry, the earth and biological sciences and engineering.

"Faculty at the new institute will be appointed with the non-laboratory duties, Seaborg has served as the school's faculty understanding that they will eventually teach both undergraduates as well as graduates, and they will carry a full teaching load," Dr. Kerr asserted.

Other elements in the huge capital expansion budget provides for:

1—A \$14,177,700 expenditure for the Berkeley campus.

2—A \$50,000 item in the \$1,012,300 allocation for the San Francisco campus which will be used for "site and feasibility studies for future campus development."

3—An \$802,500 appropriation which the university plans to use in acquiring the California Farm Bureau building at 2223 Fulton St. The structure will house the University Extension headquarters, now located in a building at 2441 Bancroft Way.

Dr. Seaborg, who will assume his new post Aug. 15, will have an important role in the university expansion.

He was awarded the Nobel prize in chemistry in 1951. During World War II he headed the University of Chicago metallurgical laboratory and developed the chemical process for separating plutonium from uranium.

SEATTLE (paper)

July 19, 1958

Seattle paper.
Seaborg Heads

U. at Berkeley₃₈

BERKELEY, Calif., July 19.
—(P)—Dr. Glenn T. Seaborg, a Swedish immigrant's son who was a warehouse worker before turning to the science career that won him a Nobel Prize, will be the new chancellor of the University of California's Berkeley campus.

The regents last night unanimously chose Dr. Seaborg, 46, as successor to Dr. Clark Kerr, who stepped up July 1 to become president of the state-wide university.

Regents

Dr. Seaborg New UC Chancellor



NEW REGIME — President here—with Dr. Glenn T. Seaborg, Clark Kerr of University of California named chancellor of UC at Berkeley, discusses new UC emblem—shown by UC regents.

S.F. Examiner 7/19/58

Dr. Seaborg New UC Chancellor

\$55,106,290 Budget

Adopted by Regents

Dr. Glenn T. Seaborg, Nobel Prize winning professor of chemistry and associate director of the University of California's Radiation Laboratory, was appointed chancellor of the university's Berkeley campus yesterday.

Harry R. Wellman, vice president of agricultural sciences, was named to the new position of executive vice president.

The action was taken by the Board of Regents meeting in Berkeley. There were these other developments:

1—The regents adopted a \$55,106,290 budget for capital improvements in 1959-60, described as the minimum that could be earmarked if the university is to meet the pressure of increased enrollments, estimated at 17,000 more students by 1962.

2—A reciprocal agreement with Stanford University was approved, making it possible for students and professors to attend special classes on either campus.

3—A UC flag was adopted for the first time, a gold C on a blue background, with the motto, Fiat Lux, "Let There Be Light."

4—A decision was reached to expand the present La Jolla campus of the university to make it the nucleus of the new UC campus to be located in the San Diego area.

5—Unofficially from a private source, The Exam-

iner learned the new northern California campus is almost certain to be located at one of three sites in the Santa Cruz-Monterey area. It would draw students from San Mateo, Santa Clara, San Benito, Santa Cruz and Monterey Counties.

Seaborg, 46, will take over the chancellorship Aug. 15 succeeding Clark Kerr, who has been elevated to the presidency.



DR. GLENN T. SEABORG
Choice of Regents

S.F. Chronicle 7/17/58

Seaborg UC Chancellor At Berkeley

Dr. Glenn T. Seaborg, 46-year-old son of a Swedish immigrant, and 1951 winner of the Nobel prize for chemistry, was named chancellor of the University of California's Berkeley campus yesterday.

He was named by unanimous vote of the Board of Regents to succeed Dr. Clark Kerr, who became president of UC on July 1.

The regents also announced that the distinguished scientist will continue in his position as associate director of the Radiation Laboratory.

WELLMAN NAMED

Harry R. Wellman, professor of agricultural economics at Berkeley and a director of the San Francisco branch of the Federal Reserve Bank, was named vice president of the State-wide university.

James D. Hart, professor of English will continue as vice chancellor, the regents announced.

Seaborg, who in 1956 urged that teaching of science should begin in the first grade, accepted the appointment as chancellor with a statement urging a balanced educational program.

'PROPER BALANCE'

"We must exercise care to have a proper balance between the humanities, the professional areas, the social sciences and the physical and natural sciences.

"We must never allow an overemphasis in any of these areas of scholarship," he said.

Seaborg spoke about the expected tremendous growth in enrollment on the university's various campuses, which Kerr predicted yesterday would reach 103,000 students by 1970.

"As California's citizens send more students to us, and we inevitably increase in size, we must redouble our efforts not only to continue, but even to improve, the university's high intellectual caliber," the new chancellor said.

WIDE INFLUENCE

Seaborg's scientific work, and that of his associates, is felt wherever research in nuclear chemistry is conducted.

Dr. Seaborg's best known scientific accomplishment is his discovery of plutonium, used in the Nagasaki atomic bomb.

During World War II he was chief of the University of Chicago metallurgical laboratory. Here he developed the chemical process for separating plutonium from a mixture of uranium and intensely radioactive fission products.

Dr. Seaborg discovered plutonium as a product of his research on the work of Professor Edwin M. McMillan of Berkeley, who, with P. H. Abelson, discovered neptunium early in 1940.

Neptunium and plutonium were the first two elements discovered that were heavier than uranium.

BORN IN MICHIGAN

The new chancellor is a lanky, quiet-spoken man, well liked by his associates both in and out of the sciences.

He was born in Ishpeming, Mich., on April 12, 1912. He worked in a warehouse as a stevedore before entering the University of California at Los Angeles in 1929.

In 1937 he earned his Ph. D. with a thesis about "the inelastic scattering of fast neutrons."

He was married to Helen L. Griggs in 1942. They have five children: Peter, 12; Lynne, 10; David, 9; Stephen, 7, and Eric, 3. The family lives at 1154 Glen road, Lafayette.

Wellman, the new vice president of the State-wide university, was named to a post created in 1949, but filled only now.

He is 59, a graduate of Oregon Agricultural College, and a native of Canada. He and his wife, Ruth, live at 61 Rock lane, Berkeley.

Glenn T. Seaborg, Nobel Laureate, Is UC Chancellor

Dr. Glenn T. Seaborg today was named chancellor of the University of California campus here coincident with an announcement that UC and Stanford University will have an exchange program for graduate students.

Dr. Seaborg, 46, the son of a Swedish immigrant, succeeds Clark Kerr who was appointed to the presidency of the University on July 1, succeeding Robert Gordon Sproul.

The UC Board of Regents also announced that Harry R. Wellman, professor of agricultural economics here and a director of the Federal Reserve Bank, will be vice president of the State-wide institution.

James D. Hart, professor of English, will continue as vice chancellor.

Dr. Seaborg, who will remain as associate director of the Radiation Laboratory, won the Nobel Prize for chemistry in 1951.

FOUND PLUTONIUM

One of his best known accomplishments was the discovery of plutonium which was used on the atomic bomb dropped on Nagasaki in World War II.

In accepting appointment Dr. Seaborg said:

"We must exercise care to have a proper balance between the humanities, the professional areas, the social sciences, and the physical and natural sciences.

"We must never allow an over-emphasis in any of these areas of scholarship."

The new Chancellor was born in Ishpeming, Mich., and worked as a stevedore before he entered UCLA in 1929. He obtained his PhD in 1937 with a thesis about "the inelastic scattering of fast neutrons."

He and his wife, Helen, have five children, Peter, 12, Lynne, 10, David, 9, Stephen, 7, and Eric, 3. The family resides at 1154 Glen Road, Lafayette.

The Board of Regents also reported that the school and Stanford University have agreed to make their graduate school facilities more available to each other.

Graduate students in each university may take courses in the other if they wish to make wider use of personnel at both schools. The program is a new one in the West, though it has been practiced by Harvard University and the Massachusetts Institute of Technology.

The Regents also:

Said the Berkeley campus will place more emphasis on graduate studies but will continue lower level teaching "on a substantial level."

Adopted a flag—a blue and gold banner, with a large "C" in the middle, and a streamer flying the school slogan, "Fiat Lux," (Let There Be Light).

Decided the first new campus for an engineering and technical school will be in the La Jolla area, if a proper site can be found.

Announced a \$55,000,000 capital improvement program which will benefit the student population expected to reach 58,000 by 1962.

Accepted gifts and pledges totaling \$1,169,021.

July 28, 1958

Chancellor Seaborg

DR. GLENN T. SEABORG is a splendid choice as new chancellor of the University of California at Berkeley. He is a scientist, a nuclear chemist of renown. It would be natural to conclude that his appointment is an expression of the dominant role science has come to play in man's affairs, and that it foreshadows the direction of future emphasis at the University. Yet such a conclusion would be erroneous.

Large though Doctor Seaborg's stature is in the world of science he is not primarily a scientist but a scholar and, most of all, an educator. He sees education's functions in the broadest terms, as a principal source of the well-being of mankind and—the world being what it is—a major means to mankind's survival.

Long before the Russian sputniks Doctor Seaborg left his laboratory to urge from scores of forums a broadening and toughening process in American education. He emphasized the need for this process in the humanities, the social sciences and the professions as well as in his own field of the physical sciences.

If he belongs in any tradition it is that which produced such men as Dr. James B. Conant, former president of Harvard University and likewise a chemist of the first rank. They are a breed of scientist-educators with far ranging intellects; the world needs more of them.

Having emphasized Doctor Seaborg's academic breadth we now reverse our field to note with pleasure that he will continue as associate director of the great UC Radiation Laboratory, and that the Seaborg research team that performed so notably in microchemistry and the discovery of the transuranic elements will remain intact. We hope this means the university, in gaining an administrator, has not lost a scientist.

The Daily Californian

MONARCH OF THE COLLEGE DAILIES

Berkeley, California, Tuesday, July 29, 1958

Seaborg assumes Chancellorship at Berkeley campus

Glenn T. Seaborg, professor of chemistry at the University of California was named Chancellor at Berkeley at a recent Regents' meeting.

Seaborg's appointment will become effective August 15 following his vacation. He will continue to serve as associate director of the Radiation laboratory and his research team will remain intact to continue its work under his direction.

Chancellor-elect Seaborg is noted for his research on the transuranium elements, for which he and Professor Edwin M. McMillan received the Nobel Prize in chemistry in 1951. Since 1940, he has been co-discoverer of all nine artificial elements between plutonium (element 94) and the recently discovered element 102.

Seaborg was educated at the University of California, taking his A.B. degree on the Los Angeles campus and his doctorate at Berkeley. He is the only University alumnus who has been named "Alumnus of the Year" by the alumni associations of both campuses.

Between 1942 and 1946, Seaborg as director of plutonium research for the Manhattan project at the University of Chicago Metallurgical laboratory. One of his principal responsibilities there was the working out of the complete chemical process for the separation of plutonium.

Following is a statement by Seaborg made upon his acceptance of his appointment to the Chancellorship.

"During the past 29 years it has been my privilege to be associated with the University of California, first as an undergraduate on the Los Angeles campus and then as a graduate student and faculty member on the Berkeley campus. I have come to appreciate more and more



GLENN T. SEABORG, pictured above was named Chancellor at Berkeley, replacing recently-appointed President Clark Kerr.

the broad and important role the University plays in our society. I have become aware that my professional colleagues, the President, and the Board of Regents all hold their functions in the University as public trusts. To be entrusted now by President Kerr and the Regents with the leadership of our great community of scholars at Berkeley is an honor that fills me with pride, gratitude, humility, and a deep sense of responsibility.

All of us who know the history of the University and who think about its future appreciate the challenging opportunities ahead. Under President Sproul's leadership the University has experienced a magnificent period of growth and has matured into one of the world's great centers of learning. In President Kerr we have a leader whom

we may confidently expect to increase even more the stature of our university.

To continue our tradition of bigness and high quality in the years of rapid growth that lie ahead will test our imagination and our skill. There are difficult problems in faculty staffing, in the construction of physical plant and in the maintenance of the vitally important but less tangible relationships between faculty and students which inspire the best performance of both.

It is my conviction that the greatness of a university derives from the intellectual status of its staff. We have earned the respect of the people of California and of the academic world by traditionally attracting faculty and students of high caliber. As California citizens send more students to us and we inevitably increase in size, we must redouble our efforts not only to continue, but even to improve, the University's high intellectual caliber. We must exercise care to have a proper balance between the humanities, the professional areas, the social sciences and the physical and natural sciences and we must never allow an overemphasis in any one of these areas of scholarship.

As for the matter of size, we must remember that bigness has some advantages as well as liabilities. A large university with a great faculty can offer students a richness and breadth of intellectual opportunity, as well as great libraries and research facilities, that cannot be duplicated in a smaller institution. Our challenge is to continue to put such assets to work for the greater good of students, faculty, and the people of California.

BERKELEY GAZETTE

July 30, 1958



Chief Justice of the US Supreme Court Earl Warren, second from right, examines a rare copy of the first volume of Dallas' "US Supreme Court Reports" of 1790 with Perc S. Brown, right, who presented the volume along with other items of Americana to the University of California. Looking on are UC Chancellor Glenn Seaborg, left, and President Clark Kerr. The items were presented in honor of Chief Justice Warren's visit to the law school on the Berkeley campus. *Berkeley Gaz. 7/30/58* Gazette photo

Seaborg New U. C. Chancellor

Dr. Glenn Seaborg, Associate Director, was appointed Chancellor of the University of California at Berkeley effective August 15. Dr. Seaborg also will continue as Associate Director of the Laboratory. He will succeed Dr. Clark Kerr, who recently became President of the University.

Dr. Seaborg earned his A.B. from the University of California, Los Angeles, and his Ph.D. from the University of California, Berkeley, both in chemistry. He began his chemistry career as Laboratory Assistant to the late Dr. Gilbert Newton Lewis, then Dean of the College of Chemistry at Berkeley.

In 1939 Dr. Seaborg became an instructor on the Campus and two years later was promoted to Assistant Professor. In 1940 Dr. Seaborg and his associates discovered plutonium, which was so important to the atomic-bomb project. In the spring of 1942, shortly after the Pearl Harbor attack, Dr. Seaborg was asked by the United States Government to work on the Manhattan Project in Chicago, the organization set up to develop the atomic bomb.

Dr. Seaborg returned to the University in May 1946 as full Professor at the University and was appointed Head of the Chemistry Department for the Radiation Laboratory. In 1954 he was appointed an Associate Director of the Laboratory.

Dr. Seaborg, one of the outstanding scientists of our time, has been the recipient of numerous honors, the most notable being the Nobel Prize, which he shared in 1951 with Dr. Edwin McMillan (also Associate Director of the Laboratory) for pioneering work on the transuranium elements. He has been a Lecturer at several colleges and appointed to a number of high-ranking committees and posts. He has been the au-

thor or co-author of nearly 160 books, articles, and papers on nuclear studies and with his associates has compiled a complete table of isotopes.



Dr. Glenn Seaborg

Along with carrying out his busy scientific career, Dr. Seaborg has been Faculty Athletic Representative for the Berkeley Campus. In his acceptance statement following the Regents' meeting on July 18, Dr. Seaborg said, "We must exercise care to have a proper balance between the humanities, the professional areas, the social sciences, and the physical and natural sciences; and we must never allow an over-emphasis in any one of these areas of scholarship."

Transmutation Time 8/4/68

A few months ago Chemist Glenn Seaborg talked warmly of the compensations of his calling: "Stable employment, reasonably good pay, and considerably less pressure and worry than many other groups—such as educators." Sometime in August, Seaborg, who won a Nobel Prize with Physicist Edwin McMillan for discovering plutonium (the pair also discovered berkelium, californium, four other elements), will leave his post as associate director of the University of California's Radiation Lab at Berkeley to become a fulltime educator. New job: chancellor of the university's Berkeley campus (18,981 students), replacing Clark Kerr, now president of the university (TIME, July 28).

A tall, blunt-featured man whose interests have long ranged farther than the laboratory, Seaborg follows Cal teams on out-of-town trips, turns up at locker-room wakes—and also fights football professionalism. In 1957 he became a leading teacher-by-television in the science series programmed by San Francisco's hot-shot educational TV station, KQED. He recently helped overhaul math and science teaching in California public schools.

At first reluctant to spend as much time away from the Radiation Lab as his new job will require, Chancellor-elect Seaborg has pledged himself to "keep uppermost in mind the crucial and classical function of a university in society: to foster free inquiry and teaching under the highest possible standards of objective scholarship." But many scientists will still wonder whether one of the world's best chemists should pour himself into the world of university management—which, even at one of the best campuses in the nation, consists largely of parking problems, building plans and ruffled regents.

CAL PREXY SEES END OF PCC TODAY

Seaborg Visions New 5-School Loop Patterned After Ivy League

PORTLAND, Or., Aug. 9 (AP)—The Pacific Coast Conference will be dissolved here this week end, says Glenn T. Seaborg, chancellor of the University of California.

What will that mean?

For one thing, said Seaborg, a new athletic alliance will be formed — one that is smaller, patterned after the Ivy League and based upon a gentlemen's agreement.

"I think the conference will be disbanded," said Seaborg. "The intentions of all the faculty representatives are to dissolve it."

Closed to Public

The meeting to put the 43-year-old conference quietly to sleep began today. The meeting, as usual, was closed to the public and press.

Five of the nine Pacific Coast Conference members will form a new conference within a year, Seaborg said. Those schools, he said, are California, UCLA, Southern California, Washington and Stanford.

"Oregon State certainly has not been involved in our considerations," Seaborg added. Nor, he said, are Oregon, Washington State or Idaho being considered.

Like Ivy League

The new conference, he said, will be one based upon "mutual trust and individual institutional responsibility. It will be like the Ivy League, without strong policing methods but based on a gentlemen's agreement."

Seaborg said the schools will police themselves. "For instance, if California thought Stanford was doing something wrong, then we wouldn't play Stanford again."

Such an alliance, he said, will be in existence by next summer, and he added: "I think it will work."

Seaborg said the basic reasons for the breakup have been growing for many years.

For a long time, he said, the conference's schools all had comparable entrance requirements and scholastic standards for athletes and were of about the same size.

However, Seaborg said, the California schools and the University of Washington now not only are larger but have significantly higher academic standards.

The California members, he said, find themselves at a disadvantage in recruiting. But the biggest reason for the change, he said, is to band together schools with similar academic standards and entrance requirements.

Penalties Not Factor

Penalties against several California schools for illegal aid to athletes are not a factor in the breakup, Seaborg said.

"We could have survived if the other things weren't there," he said.

Seaborg said the new alliance will not be filled with extravagant aid to athletes.

Emmett Moore of Washington State, which will be one of the PCC orphans, said, "I suspect that the conference will be disbanded. One or two negative votes don't mean anything."

"I had hoped right to the very deadline that the conference would continue," he said.

Bowl in Question

Neither Seaborg nor Moore would comment on what will happen to about \$200,000 in the PCC treasury, or whether the new alliance will pick up the pot of gold the Rose Bowl represents.

Both questions, however, will be discussed at the meeting—which will end tomorrow.

August 9, 1958

PCC Breakup Scheduled This Weekend —Seaborg

New Conference Seen Within A Year

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What will that mean?

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OWN POLICE

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athletes are not a factor in the breakup, Seaborg said.

"We could have survived if the other things weren't there," he said.

In Lexington, Ky., Friday night, Stanford football coach Jack Curtice said he thought the small stadiums of several northern members had prompted the breakup.

NO ROUND-ROBIN

"Money hasn't been in my thinking," said Seaborg, but he added that the California members disliked round-robin schedules.

Seaborg said the new alliance will not be filled with extravagant aid to athletes.

The PCC had some advantages, said Seaborg. One of them was that it had nine schools.

Emmett Moore of Washington State, which will be one of the PCC orphans, said "I suspect that the conference will be disbanded. One or two negative votes don't mean anything.

"I had hoped right to the very deadline that the conference would continue," he said.

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August 9, 1958

Officials Meet for PCC Wake

PORTLAND (Ore.), Aug. 8. — (UPI) — Grim faced men from the faculties of the biggest colleges on the coast checked into the Multnomah Hotel here today for a meeting that was expected to spell the end of the Pacific Coast Conference.

Two big question marks hung over the PCC as its faculty representatives gathered for a two day meeting that opens tomorrow morning. One was, which representative from which school would shoulder the responsibility of actually submitting a resolution for dissolution of the 34 year old conference? The other: what kind of an association will be formed to take the place of the conference that seemed unable to weld together its dissident North-South elements?

Coaches were generally agreed that the member schools could not satisfy their athletic aims nor their fans as independents. There was talk of a Big Five with Cal, USC, UCLA, Washington and Stanford, or a Big Six, possible, with Oregon State added.

The California schools, which sparked the dissolution movement, have long contended they were too big to be bothered with some of the smaller schools in the North, or with their tiny stadiums that held down the take at the gate.

Still another unresolved question was the Rose Bowl, the profitable corollary of the PCC.

Meetings of the faculty representatives are traditionally conducted behind closed doors with news briefings twice daily. Not until the first of these was held tomorrow would the answers to the Coast's biggest sports questions begin to take shape.

Seaborg Views

Dr. Glenn T. Seaborg, University of California faculty representative, said that as far as he knew the PCC meeting in Portland would be held "solely for the purpose of amicable dissolution."

Contacted just before departure and told that dissolution was "a cinch," Doctor Seaborg responded, "I hope so."

Asked if California had any proposals as to the future, he declared, "None along the

It's Official: PCC Votes to Dissolve

9 Schools to Share \$175,000 in Treasury

PORTLAND, Ore., Aug. 9 (AP)—The Pacific Coast Conference was put quietly and quickly to death today.

Faculty representatives of the nine member schools voted unanimously to dissolve the 43-year-old conference effective June 30, 1959. And they arranged to distribute the \$175,000 which is expected to be on hand in the treasury next June.

The meeting, scheduled for two days, adjourned after a brief afternoon session in which plans for participation in the Rose Bowl were discussed.

Chancellor Glenn Seaborg of the University of California, who acted as conference spokesman at a meeting with the press, said the group had reached agreement on a plan for participation in the traditional New Year's Day game at Pasadena in 1960.

He said the plan will be presented to other parties of the contract—the Tournament of Roses Association, the National Broadcasting Company and the Big Ten.

Seaborg said he could not disclose the plan until it had first been pre-

sented to the other parties.

The only other matter taken up at the afternoon meeting was a plan to maintain an organized staff of officials to referee athletic contests for members of the now-dead PCC. Seaborg declined to discuss details.

Seaborg said there was no talk of formation of a new conference among members of the old group. Last night, however, he had told the Associated Press a new athletic alliance definitely will be formed.

He said the group would be smaller, patterned after the Ivy League and based upon a "gentlemen's agreement." Seaborg said the new group will be formed within a year and will include California, UCLA, Southern California, Washington and Stanford.

The faculty representatives, accompanied by the schools' athletic directors, wasted no time in delivering the final blow to the conference. Stanford representative Rixford Snyder introduced the dissolution motion 25 minutes after the morning session started. It was seconded by Emmett Moore of Washington State College and passed unanimously "with no discussion," Seaborg said.

But it was not until noon that the tall, sun-tanned Nobel Prize winner in chemistry told the press with a half smile, "I have

a minor resolution to read."

The resolution to distribute the assets—according to the existing conference formula of 5 per cent to Idaho and 11.87 per cent to each of the other eight conference members—was introduced by the University of Washington and seconded by Oregon State. It was passed, 8-1, with only Idaho voting "no."

Bernard Hammerbeck, acting conference commissioner, estimated about \$175,000 would remain in the treasury after the conference obligations have been met. The treasury has been increased in recent years by Rose Bowl receipts withheld from Washington and three California schools—California, Southern Cal, and UCLA—as penalties for violations of conference rules.

Asked if there were any tears shed as the dissolution motion was passed, Seaborg said, "I didn't see any, but I am sure there was some feeling."

August 10, 1958

PCC-Rose Bowl Pact Dead in '60

PORTLAND, Ore., Aug. 11 (UPI) — The Pacific Coast Conference is terminating its Rose Bowl contracts with the Pasadena Tournament of Roses, the Big Ten and the National Broadcasting Company after the January 1, 1960, game, acting commissioner Bernard A. Hammerbeck announced here today.

Hammerbeck made the announcement following conclusion of the special PCC meeting here Saturday at which members voted to dissolve the conference as of June, 1959.

At the time of the announcement that the PCC was dissolving, conference spokesmen disclosed action also had been taken concerning the Rose Bowl but that it was withholding further statement until other contracting parties had been advised of its decision. There will be two more Rose Bowl games under the old proceedings—January 1, 1959, and January 1, 1960.

With the death of the Pacific Coast Conference laid out for the historians, the swing is to what comes next for big college athletics on the West Coast.

The speculations, although the 43-year-old loop actually does not dissolve until June 30, 1959, ran high immediately following the vote for disbandment here Saturday.

Dr. Glenn T. Seaborg, Chancellor of University of California, divisioned a new alliance. He said he expected the four "rebel" schools, Cal, USC, UCLA and Washington might realign with one other school,

Stanford, in a smaller conference, one "patterned after the Ivy League and based upon a gentlemen's agreement."

He made it clear that the other four PCC schools, Oregon State, Oregon, Washington State and Idaho, did not figure in these plans.

The four schools, however, that originally announced they were bolting the PCC met together among themselves with Stanford conspicuously absent.

Pacific Coast Conference Dissolved

BASEBALL
RACING

Los

Los Angeles

Times



LIBERTY UNDER THE LAW

TRUE INDUSTRIAL FREEDOM

VOL. LXXVII

IN FIFTEEN PARTS

★★★†

SUNDAY MORNING, AUGUST 10, 1958

Pacific Coast Conference Dissolved

Members Vote to
Divide \$175,000
Cash in Treasury

PORTLAND, Or., Aug. 9 (AP) — Faculty representatives today dissolved the Pacific Coast Conference and made arrangements for distributing the \$175,000 in the conference treasury.

Glenn T. Seaborg, chancellor of the University of California, who acted as spokesman for the conference at a meeting with the press, said the vote for dissolution of the 43-year-old nine-member conference was unanimous.

No Debate on Motion

Seaborg said the motion was made by Stanford and seconded by Washington State. He said there was no debate.

Then Washington made a motion for distribution of the conference assets. Oregon State seconded it. It called for all the money in the treasury to be distributed to the nine conference members on the basis of the existing conference formula—5% to Idaho and 11.87% to each of the other eight conference members. This motion carried, 8 to 1, with only Idaho opposed.

Only Two Items

Seaborg said there was no discussion of forming a new athletic organization at the morning session. The matter of dissolution and distribution were the two big items faced by this meeting and they both have been disposed of, he said.

However, he added that the Rose Bowl contract—formerly between the Pacific Coast Conference and the

Big Ten—will be discussed further.

The resolution to break up the conference calls for its finish as of June 30, 1959. It also calls for the scheduled meetings of the winter of 1958 and the spring of 1959 to "proceed to the consideration and settlement of any and all conference responsibilities and obligations."

Some Feeling Expressed

Asked by reporters if any tears were shed because of the dissolution, Seaborg replied: "I didn't see any, but I am sure there was some feeling."

Reporters at the press conference had placed a black wreath on the press table. In the center was a card, edged in black, bearing the dates 1916-1958. The conference was born in Portland in 1916.

The conference treasury has been increased in recent years by funds withheld from Rose Bowl receipts as penalties assessed against three California schools and Washington.

Cal Sparks Drive for New Sports Loop

By ED SCHOENFELD

PORTLAND, Ore., Aug. 9—University of California at Berkeley will within the next two weeks call for formation of a new Pacific Coast Intercollegiate Athletic Association. And UCLA, USC and University of Washington will answer the call.

Stanford? That still remains questionable.

The new association will start operations July 1, 1959—one day after the 43-year-old Pacific Coast conference officially is dissolved.

Officials of USC, UCLA, and Washington are leaving the leadership of formation of the new league up to Dr. Glenn T. Seaborg, newly appointed chancellor of the Berkeley institution.

California's key role was learned for the first time here today after PCC officials in just three minutes voted 9-0 to adopt Stanford's resolution the conference disband.

One of the officials, Prof. Don Wollett of Washington, is anxious to form the new association without delay.

Asked when he hoped the new alignment of the coast's major universities would be completed, the Washington professor declared: "this afternoon would suit me just fine."

Prof. Rixford B. Snyder, Stanford's faculty athletic representative to the PCC and the conference president, refused to shed any light on the Palo Alto institution's plans. In fact Snyder would not talk to newsmen.

Charles A. (Chuck) Taylor, Stanford's assistant athletic director, would talk. He said Stanford has not yet reached a decision. "We don't know what we'll do," Taylor said "Stanford tends to move slowly in matters of this nature."

The Stanford director was asked about his attendance as an observer at three exploratory meetings held so far by California, UCLA, USC and Washington.

"We're in no hurry to jump into anything," he stated. "I would like to see a few things about the new association spelled out for us."

Stanford's decision to join the new grouping is up to J. Wallace Sterling, its president. He has the authority to deal the Indians "in" this month despite the fact another board of trustees meeting is not slated until the third week in September.

Football scheduling between

the "Big Five" presents no problem. They are already slated to play each other up to and including 1964.

Stanford and Washington have scheduled the four, plus Oregon, Oregon State and Washington State through 1964.

Oregon, Oregon State, Washington State and Idaho have games on the docket through 1964, but as yet no plans for any new alignment in the Northwest.

In fact, the four institutions haven't even discussed such a possibility.

It appears as if they will remain as athletic independents with some, particularly Oregon State, hopeful they will eventually be asked in the league with California, UCLA, USC, Washington and Stanford.

Dean Orlando Hollis, for the past 18 years Oregon's faculty representative to the PCC, says he does not envision formation of any new Northwest league. Hollis believes there are too few schools to make up a circuit and no possibilities for others to join them.

Aside from giving the PCC the distinction of being the first major intercollegiate conference in modern times to dissolve, representatives of the nine member schools decided on the division of the \$175,000 in the conference strongbox.

It proved by an 8-1 vote, with Idaho the dissenter because it will get the smallest share of the money.

The adopted resolution, offer by Washington, gives all member institutions except Idaho 11.875 per cent of the money. Idaho will receive 5 per cent.

OAKLAND TRIBUNE
August 10, 1958

Ironically, the decision to kill off the PCC came in the city of its birthplace. And right next door to the building where it was formed Dec. 2, 1915, by California, Washington, Oregon and Oregon State.

Dr. Seaborg, spokesman for the PCC at this meeting, reported there was no debate when Stanford offered this PCC-killing resolution:

The PCC be formally and finally dissolved as of June 30, 1959, and that the conference at this meeting and at the regular winter 1958 and spring 1958 meetings proceed to consideration and settlement of any and all conference responsibilities and obligations.

Washington State seconded the resolution. Voting began at 9:27 a.m. by 9:30 a.m. the PCC was a goner.

No tears were shed, Seaborg reported.

"There probably was some feeling," he remarked, "but nothing visible."

Conference Death Blow Unanimous

By Hal Laman

Journal Executive Sports Editor

The Pacific Coast conference did as was expected Saturday.

Conference officials voted unanimously to dissolve with the resolution introduced by Stanford and seconded by Washington State college Saturday morning at the Benson hotel.

GLENN T. Seaborg, chancellor of the University of California, was spokesman for the conference.

Stanford's resolution read this way:

"That the Pacific Coast Intercollegiate athletic conference formally and finally be dissolved as of June 30, 1959, and that the conference at this present meeting and at the regular winter 1958 and spring 1959 meeting proceed to the consideration and settlement of any and all conference responsibilities and obligation."

THE JUNE 30, date corresponds with the date set previously by four "rebel" schools, California, UCLA, Southern California and Washington for withdrawing from the conference.

The conference passed a second resolution making arrangements for distributing the conference assets. It was introduced by Washington, seconded by Oregon State and passed 8-1 with Idaho dissenting.

THE RESOLUTION read:

"That the conference assets remaining after 11 conference obligations accruing prior to June 30, 1959, have been met shall be distributed to the nine conference members on the basis of the existing conference formula, to wit: five percent to Idaho and 11.875 percent to each of the other eight members."

The assets are figured to slightly less than \$200,000.

SEABORG said there was discussion of forming a new conference or reorganization.

The special meeting is scheduled to continue through Sunday.

An American Paper for the American People

Publisher: Franklin S. Payne

Editor: Warden Woolard

LOS ANGELES, MONDAY, AUGUST 11, 1958

P.C.C.—R.I.P.

DEMISE of the Pacific Coast Conference, announced over the weekend, was welcome and long awaited news to collegiate sports enthusiasts.

Especially pleased are the students, the alumni and the friends everywhere of the University of Southern California, University of California at Los Angeles, University of California at Berkeley and Stanford University.

This will put the big universities of California wholly into major collegiate competition, just as we have finally been able to get into major league baseball competition after many years of Examiner campaigning.

In submitting the resolution for dissolution of the PCC, Stanford took a step as inevitable as it was overdue.

Stanford's position, made delicate by alignment with smaller schools in the face of an unrealistic attitude of PCC faculty athletic representatives, grew untenable when USC, UCLA and UC withdrew from the conference.

By moving for the PCC's dissolution, Stanford saved face in refusing to renege on its decision against outright withdrawal while accomplishing the same end result by killing the whole organization.

No longer need mandatory round robin contests between California's four big universities and smaller schools create a situation comparable to that of the tail wagging the dog.

This was a situation The Examiner urged be corrected, along with other PCC shortcomings, as far back as July 12, 1956.

In an editorial at that time, The Examiner stated that a reform should be adopted "ending the association in the PCC with schools which are joyriders on the football bandwagon," and added:

"To be arbitrary and unrealistic about proper support for athletes, is bad enough. To maintain a league of which half the members are constant underdogs, is worse . . .

"If we are to get rid of the hypocrisy that surrounds financial aid to athletes, let's also get rid of the hypocrisy inherent in the notion that sportsmanship is promoted by easy victories.

"If this means the end of the existing PCC lineup, college athletics could ask for no better change."

The editorial spearheaded a movement of opposition to the unrealistic attitude of the PCC.

Within hours after its publication no less a personage than Governor Knight publicly seconded the motion.

The following day the Los Angeles City Council adopted a resolution urging USC and UCLA give "serious consideration" to withdrawing from the PCC.

We are happy that the faculty athletic representative of Stanford finally has agreed to this inescapable conclusion and we feel confident that the public generally will rejoice greatly as we do.

Seaborg Predicts Five-Member Coast Conference

PORTLAND, Aug. 10 (AP)—The Pacific Coast Conference is dead—but not for long, say spokesmen for two of its powerful former members.

A new five-team conference will be formed within a year, said Glenn T. Seaborg, chancellor of the University of California.

And Dr. A. L. Strand, president of Oregon State College, says he wouldn't be sur-

prised if all nine members band back together within a few years.

"I really think that when people realize what has happened it won't be long until a new organization is created," Strand said.

Faculty representatives yesterday voted unanimously to dissolve the 43-year-old conference—effective June 30, 1959.

They also agreed on a for-

mula to split up \$175,000 in the PCC treasury and a plan for participation in the Rose Bowl, the latter, though, was not disclosed.

Seaborg, who acted as spokesman for the burial detail, said the new alliance will be composed of California, UCLA, USC, Stanford and Washington.

There is no place in present considerations, he said, for the other members—Ore-

gon State, Oregon, Washington State and Idaho. Seaborg said he felt bad only because the new conference would be smaller.

Strand, though, had regrets.

"Oregon State wants to belong to a conference," he said. "But I am sure some organization will take shape. I don't know how soon, but it would embrace a good many of the former members."

Strand refused to say if he thought Oregon State would be embraced, or whether he thinks Oregon State now will be an athletic orphan. He commented only that: "We don't mind being an independent for a while. We think we will do all right."

The remaining treasury money will be split up on this formula: 5 per cent to Idaho,

and 11.87 per cent to each of the other members.

Seaborg said the agreement reached on the Rose Bowl would not be disclosed until all interested parties are contacted.

The Tournament of Roses said, however, that it might be wary of entering into an agreement with the kind of athletic alliance Seaborg said will be formed. "We want to have a look at what these schools come up with. We want a good show on New Year's day and we may have no alternative other than to look to other fields. Or have no game at all," said Roses Committee Member Lathrop Leishman.

The conference will split up next summer. But this fall it still will have a round-robin schedule and send a representative to the Rose Bowl next January 1.



Tribune photo

TAKE OVER—Dr. Glenn T. Seaborg (left), new chancellor of the University of California, talks with Dr. Alex Sheriffs, vice chancellor, as they begin new jobs.

Five-Team Alliance Might Replace PCC

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ference would be smaller.

Strand, though, had regrets.

"Oregon State wants to belong to a conference," he said. "But I am sure some organization will be developed. Eventually some new conference will take shape. I don't know how soon, but it would embrace a good many of the former members."

Strand refused to say if he thought Oregon State would be embraced, or whether he thinks Oregon State now will be an athletic orphan.

He commented only that: "We don't mind being an independent for a while. We think we will do all right."

No University of Oregon

spokesman was available for comment.

The death of the conference occurred only a few hundred feet from the hotel where it was created here Dec. 2, 1915.

There was no apparent gloom among the representatives. They just folded the conference, held a brief press meeting, canceled the Sunday half of their meeting and left town.

It was very quick. But before they left they said that the remaining treasury money will be split up on this formula: 5% to Idaho and 11.87% to each of the other members.

That brought the only noticeable dissent of the meeting. Idaho cast the lone No vote, but it carried 8-1.

The Rose Bowl, however, was another question. Seaborg said the agreement reached on the Pasadena classic would not be disclosed until all interested parties are contacted.

Those who have a share of that New Year's Day pot of gold include the Tournament of Roses Association, the National Broadcasting Co. and the Big Ten.

The Tournament of Roses said, however, that it might by vary of entering into an

agreement with the kind of new athletic alliance Seaborg said will be formed.

"We want to have a look at what these schools come up with. We want a good show on New Year's Day and we may have no alternative other than to look to other fields, or have no game at all," said Roses Committee Member Lathrop Leishman.

'Big Four' Form New Grid Loop

By ED SCHOENFELD

A bold "new look" was created on America's intercollegiate athletic scene yesterday in San Francisco.

For the first time, four major universities established an association based on the idea that each school, with mutual trust and confidence in the others, will police itself.

Called the Athletic Association of Western Universities, it is composed of California, USC, UCLA and Washington. It will start operations next July 1 once the Pacific Coast Conference has disbanded.

In the "new look," according to the association's articles given newsmen at a press conference, there will be no central enforcement agent or agency. If a member institution has reason to believe that another member is violating either the letter or spirit of the articles, it may undertake to resolve its differences by discussions with that institution.

If the problem is not resolved satisfactorily by discussion, the aggrieved institution, after written notice to the other institution, may cancel any of its schedule commitments with that institution.



Tribune photo

FORM NEW ASSOCIATION—Chancellor Glenn Seaborg (second from right) of California announces formation of Athletic Association of Western Universities yesterday in

San Francisco as fellow faculty representatives look on. From left: Prof. Don Wollett of Washington, Prof. Bradford Booth of UCLA, Seaborg, Prof. Hugh Willett of USC.

There will be an executive officer of the association, but he will have no investigative or enforcement responsibilities.

Each institution has agreed to the principle of free exchange of information between member institutions in respect to the operation of its intercollegiate athletic program.

Complete information in respect to insurance requirements, academic requirements of athletic eligibility, financial aid for athletes and academic standing of its athletes shall be exchanged upon request.

The association will be governed only by the rules of the NCAA.

Abuses of the financial aid rules, which had a good deal to do with breaking up the 43-year-old PCC as UCLA, USC, Washington and California were penalized for violations, should be automatically eliminated with the new association's aid setup.

There will be no reason for an athlete to have to accept illegal aid in order to pay his room and board bill.

The new group's aid plan provides that an athlete can receive his tuition and fees and work at least 250 hours a year for his room and board. If he can not earn enough on his campus job to pay his living costs, the athlete will be given a subsistence grant by his institution to make up the difference.

Under the PCC rules, an athlete can receive only \$100 a month for working 50 hours. If the amount fails to cover his room and board cost he has to dig up the difference himself.

It was this pressure on the boys, especially in the metro-

politan areas of the PCC, that brought about the illegal aid, pointed out Prof. Bradford Booth, UCLA's faculty athletic representative.

"Now we have a chance to operate this aid program more intelligently," Booth added.

There is no provision in the new aid plan for extras (books, laundry, etc.) because the association officials feel athletes should be able to earn enough during vacation periods to cover this expense.

Free scheduling will be the rule except when the members schedule each other annually on a home-and-home basis in football, basketball, and to the extent feasible in other sports.

Asked if the institutions' basketball teams might enter into an outside league, U.C. Chancellor Glenn T. Seaborg, spokesman at the press conference, said there is nothing in the new association's articles to prohibit it.

There has been talk that despite the nine-member PCC's collapse next June 30, the schools' basketball teams still might engage in northern division-southern division competition.

From an academic standpoint, each institution, in a general sense, will establish its own rules under which an athlete is eligible for competition.

The PCC rule calling for an athlete to earn 26 semester hours of degree credit work between seasons of competition in the same sport is educationally "unsound," UCLA's Booth said. Non-athletes only need pass 24 units.

That's why the new association lowered the number to 24, Booth explained.

Hopes of a "big five" faded when Stanford failed to show up to sign the articles.

Chancellor Seaborg expressed hope that Stanford would join the association in the future. At the same time, Seaborg said he understood the Palo Alto institution had not made a decision, one way or another, in respect to the new alignment.

Prof. Don Wollett of Washington disclosed that Prof. Rixford Snyder, Stanford's faculty athletic representative, had read the association's articles and approved them.

Seaborg was asked if it is possible other PCC members—Oregon, Oregon State, Washington State or Idaho—might join the new association.

"I have heard of no indications," he replied. "It is the-

oretically possibly by a unanimous vote."

Enlargement of the group is a definite possibility, the U.C. chancellor said.

"There is nothing inconsistent in the formation of this organization and a larger national association," he continued. "There have been frequent reports of the possible formation of a coast-to-coast alignment of major institutions."

Seaborg did not elaborate on the statement.

The Rose Bowl game was mentioned.

"There has been very little discussion of the game in our meetings," the spokesman reported. "After all, we don't begin operating until next year and there is still a two-year Rose Bowl contract with the PCC."

USC Prof. Hugh Willett added: "After 1960 the Rose Bowl game belongs to the Tournament of Roses. There is no contract covering the game after that."

Tournament of Roses officials have indicated in the past they lean toward signing a pact with the new association and retaining its Coast-Big Ten relationship.

Representatives at the meeting were Dr. Seaborg and athletic director Greg Engelhard from California; Dr. Booth and Wilbur Johns of UCLA; Prof. Wollett and George Briggs of Washington, and Prof. Willett and Jess Hill of USC.

Professors Frank Kidner of California, J. Gordon Gosc of Washington and Carl Franklin of USC, new athletic faculty representatives for their schools, also attended.

Big Four (Stanford Absent) Form 'New

By CURLEY GRIEVE
Sports Editor of The Examiner

A new conference to be known as the Athletic Association of Western Universities was born here yesterday, with its four originating members acclaiming the infant as a healthy specimen destined for a long and successful life.

Officiating at the delivery room in the St. Francis Hotel were the faculty representatives and athletic directors from University of California, UCLA, USC and Washington.

They hailed the association as a "new concept" because it is based on the principle of "mutual trust and confi-

dence," with each institution responsible for the cleanliness of its own linen—no czar, no cops for policing, no fines and only their own consciences to guide them.

Actually, life will not be breathed into the infant until July 1, 1959, within 24 hours after the present Pacific Coast Conference goes out of business by unanimous vote.

By that time the Big Four hopes to have one additional charter member, Stanford.

Dr. Glenn T. Seaborg, chairman at the press conference and chancellor at UC, said that Stanford representatives

Concept Conference Here

— Professor Rixford Snyder and Assistant Athletic Director Church Taylor — had participated in all preliminary sessions and helped to formulate the articles of the association.

"I personally hope that Stanford comes in," Dr. Seaborg said.

"That goes for all of us," Professor Hugh Willett (USC) added.

The Big Four expects a decision from Stanford after its next board of trustees' meeting on the third Thursday of September.

The spokesmen indicated that the association was not

limited in size and could be expanded by unanimous vote."

In this connection, it was pointed out that academic admission requirements would be a key factor in any school's credentials.

"As of now, we are almost alike in that regard," it was stated.

Attached to the articles of association was a summary of existing admission requirements. Those at UC and UCLA were identical. USC's was strengthened by the addition of college entrance examinations (800 score in the CEEB Scholastic Aptitude Test)

which, as Dr. Seaborg noted, puts them in the "big league scholastically now."

This tightening up already has jolted the recruiting program at Troy. Professor Willett said that out of 27 hand-picked athletes, including 17 from the North-South prep football game, all but two failed to gain admission.

While Washington's entrance requirements are lower than those of the other three schools, they are almost equally as strict in respect to out-of-State students. In other words, football players from California going to Washington have to hurdle almost the same matriculation barriers as they would at Cal or UCLA.

"That compensates — we won't have California players with bad grades returning to beat us," someone explained.

TOUCHY SUBJECT.

In respect to financial aid—a touchy subject because all four schools were penalized both by the PCC and NCAA for illegal aid to athletes—the association rules provide that the total amount shall not exceed the actual cost of tuition, compulsory fees, room and board at campus rates.

An outright "subsistence grant" of cash is permissible under certain conditions, as explained in this paragraph of the article:

"A student athlete who, as evidence of need, works at least 250 hours of an academic year at the going employment rate on a bona fide job provided by the institution or athletic association may receive from his institution a subsistence grant equivalent to the difference between his earnings and the cost of room and board in recognition of the loss of opportunity to work during the practice and playing seasons."

Each institution will set its own "living cost" standard and a full exchange of information among members in this and all other regards is required.

NO HIGH COURT.

In case of any "rhubarbs" the disputants can either get together and settle their dif-

ferences or refuse to schedule each other.

The rules provide for an "executive officer" who will keep statistics and supervise officials, but do no investigative or enforcement work.

Doctor Seaborg pointed out that there would be "nothing inconsistent in association members being part of a larger, national organization" such as that recently rumored that would embrace the Big Four, service academies and larger independents.

On whether the Big Four — or Big Five, if Stanford joins — will take over the Rose Bowl, Dr. Seaborg made only this comment:

"There was not too much discussion on the Rose Bowl angle. The Coast Conference will be in charge of the game for the next two years. Then, with no existing contracts, it reverts to the Tournament of Roses Association. We have no understanding now with the Pasadena officials."

It's a cinch, however, that this is one of the ultimate targets of the new group.

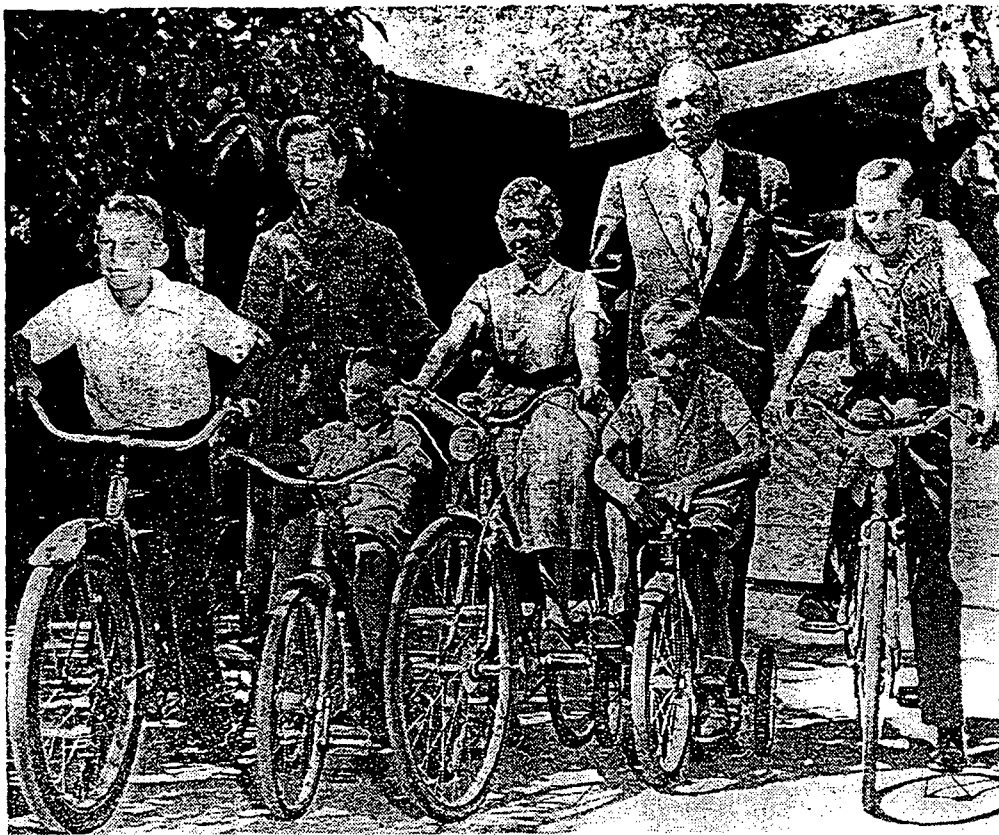
FREE CHOICE.

In respect to scheduling, association members are given a "free choice of opponents" but agree to schedule each other on a home-and-home basis in football, basketball and, where feasible, other sports. This is a revolt against the old PCC round-robin which led one official to remark:

"We won't feel ganged up against and dictated to in this new setup."

The articles of the association will be fortified with bylaws at some future point. On subjects not specifically covered, rules of the NCAA will be followed.

Representatives at the meeting included: California — Dr. Seaborg, faculty delegate Frank Kidner, Athletic Director Greg Engelhard; UCLA — Dr. Bradford Booth, Athletic Director Wilbur Johns; USC — Professor Willett, Professor Carl Franklin (delegate-elect) and Athletic Director Jess Hill; Washington — Professor Don Wollett, Professor J. Gordon Gose (delegate-elect) and Athletic Director George Briggs



MOBILE FAMILY — Glenn Seaborg, new chancellor of the University of California, and his wife, Helen, with their five cycling children at home in Lafayette. From left, the children are David, 9; John Eric, 4; Lynne, 11; Stephen, 7; and Peter, 12.

S.F. Examiner
9/24/58

Dr. Seaborg as UC Chancellor Aims for Balance in Curriculum

Dr. Glenn T. Seaborg, always a wearer of many hats, had to take one of them off for good yesterday.

Following years of service as University of California faculty representative to the Pacific Coast Conference and its newly-formed successor, he quit after briefing reporters at a morning press conference here.

As a distinguished nuclear chemist, Nobel laureate, author, scholar, researcher, and teacher, his newest job—Chancellor of the Berkeley campus—just did not leave enough time any more.

So Doctor Seaborg, as Chancellor, appointed Professor Frank Kidner of the economics department to succeed him as faculty athletic representative on the new Big Four of the West.

Since the tall, spare scientist has been chancellor for less than 10 days—succeeding Clark Kerr, now UC president, on Aug. 15—he explained that he had no specific changes in mind, insofar as his job was concerned.

“But there are particular areas being looked into,” he said, referring to the present curriculum at Berkeley.

His aim, as far as curriculum is concerned, is a proper balance among the humanities, the professional areas, the social sciences and the physical and natural sciences, he said.

NOT ONE-SIDED.

“We must never allow an over emphasis in any one of these areas of scholarship,” he said. “I want to make it especially clear, as a scientist, that I don’t think

science should be over emphasized either.”

At his ranch-style Lafayette home, Doctor Seaborg demonstrated that he can shift gears from one task to the next with seemingly effortless grace.

One minute he would softly cajole his daughter and four sons into posing for a picture; the next he would earnestly discuss administration tasks.

The 46 year old university leader said he will also work toward making UC even more attractive to prospective faculty members “so that we can do some aggressive recruiting.”

With the huge number of students expected within a few years, he said, such recruiting will become intensely competitive among the country’s colleges and universities.

DAY-TO-DAY.

As for Doctor Seaborg’s day-to-day life, he expects to get up about 7 o’clock in the morning, leave the house a little before 8, and leave the chancellor’s office for home around 6.

Because he is still associate director of the university’s radiation laboratory, he hopes to get up there “a couple of times a week” and to continue teaching two or three graduate students in chemistry.

Asked how he manages to get any “homework” done in his study, with the children dropping in now and then, he smiled and said:

“I can work with distractions. They don’t bother me, unless all five were in here at once.”

WIFE BUSY.

Doctor Seaborg’s handsome wife, Helen, has a schedule as busy as her husband’s, and prefers it that way.

She does all the cooking, all the laundry, and takes care of the five children herself.

“She ironed all my shirts herself until just recently, the new Chancellor said proudly.

But when the Seaborgs go out in the evening, they normally get two baby-sitters to take care of the kids.

“We do that so if one is overwhelmed, the other can call for help,” he said.

Glenn T. Seaborg

NUCLEAR POWER: ITS STATUS TODAY AND SOME CONCLUSIONS

(Glenn T. Seaborg, Chancellor of the Berkeley campus and Associate Director of the Radiation Laboratory, drew on his broad acquaintance with developments in the field of nuclear power to discuss "Nuclear Power—Its Scientific Basis, Its Current Status and Some Conclusions" before the Northern California World Affairs Council Conference on the International Atom last spring. Chancellor Seaborg's remarks, which approach such important questions as the nature and progress of United States peacetime nuclear development, the problems and prospects connected with extending nuclear power facilities to other countries, and competitive coexistence with the Soviet Union, have been excerpted for the article which appears below.)

There is hope that reactions involving the fusion of light elements, rather than the fission of uranium, can be harnessed for power generation. This is referred to as taming the H-bomb or controlled thermonuclear power. We have a large secret project, known as the Sherwood Project, in which work is being done on fusion. From the unclassified reports which have appeared, it seems evident that this is an enormously complex problem with no likelihood of widespread practical application in the near future; however, given faith generated by scientific successes in the past, we may reasonably conclude that it will ultimately yield to the attack. This is important, because the raw materials for such a plant are limitless and the end products of the reaction are not radioactive.

The second peacetime application of atomic energy is the use of the by-product radioactive substances in research work for atom-tagging experiments. In atom-tagging or tracer studies, as they are sometimes called, an element in its stable form is tagged or labelled by mixing it with a radioactive form of the same element. Then the course of the element, for example through the human body or a chemical reaction, can be followed quite easily.

Radioactive Tracers

Today there are about 1,000 radioactive substances known, most of them made radioactive by artificial means, that is, by bombardment of suitable targets with nuclear particles. The Oak Ridge National Laboratory in Tennessee has made about fifty thousand shipments during the last seven years to medical institutions, hospitals, universities, and public and private research institutions throughout the world.

It has been estimated that the use of radioactive tracers will soon be saving American industry and agriculture a billion dollars per year and it is predicted that by 1960 or 1962, the saving will be five billion dollars annually and hence, eventually, such saving will pay the way for the entire American effort in nuclear energy.

What has been happening in the nuclear power field within the United States within the last few years? First, let me state categorically that the United States is far out in front in over-all nuclear know-how, depth of industrial experience and numbers of trained nuclear technicians,

UNIVERSITY BULLETIN

Vol. 7, No. 4

August 25, 1958

DOUGLAS K. YOUNG, Editor

Issued each Monday in fall and spring semesters except during Christmas and spring recesses, and every other Monday during Summer Sessions.

All matters concerning the "University Bulletin" should be addressed to one of the following:

Berkeley.....Maynard T. Morris
Davis.....Ralph D. Smith
La Jolla.....Thomas A. Manar
Los Alamos.....David M. Stearns
Los Angeles.....Andrew J. Hamilton
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Santa Barbara.....George Obern
College of Agriculture.....William F. Calkins
University Extension.....Wilson Schooley
(north), and
Miss Ann Sumner
(south)

Office of the Assistant to the President

scientists, and engineers. The fact that the United Kingdom has built more large scale plants than we have, does not change that statement. We have not felt the same compelling reason to plunge headlong into nuclear power construction and our policy has been to carry out a broad scale development of all the basic reactor types and to develop deliberately broadly based industrial experience in these types before we locked in our wide scale applications to a particular type which might not be the best one for the long pull.

Export Market

The major immediate goal of private industry is to get into the export market. There is no question that European nations will be importing nuclear components and/or entire plants very soon, and it is felt that we should be able to supply this demand. Building reactors for others who need them *now* will give us the experience we need to design and build the reactors we shall need for ourselves *later*. The felt need to supply this immediate European market is giving considerable drive to our own developmental program which we did not feel when we surveyed the domestic field only. Also, there is a strongly held feeling, containing rational and irrational overtones, that it is good foreign policy to maintain our lead as the major nuclear power in industrial applications as well as in weapons.

In the immediate future, we may expect to see a stepped up activity in the nuclear power field. More private capital will be raised and spent, but the major funds will come from the federal government. The government will continue its basic philosophy of exploring all promising reactor types and of developing new techniques, particularly high temperature techniques required for more efficiency. Government construction of large scale reactors may increase, but government-industry co-operation in reactor building will also increase.

Recently, there has been considerable talk of using the heat from the reactor simply as heat rather than as electrical power. This talk is stimulated by the knowledge that 80% of industrial power is used in the form of heat for space heating or process heating. Sweden is quite interested in this approach and is constructing several reactors of 100 megawatts heat capacity to supply 120° steam for space heating to whole communities.

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Nuclear-Powered Locomotion

Nuclear power can be applied to locomotion, but because of the nature of the chain reaction and the necessity for heavy shielding, nuclear power is not applicable to small units such as automobiles, trucks or tractors. Considerable effort has been given to aircraft propulsion, and we may someday see the engineering problems mastered for this application. Nuclear power for rockets and for space vehicles is also under study. The greatest success in nuclear propulsion has been in submarine power plants. Naturally, there has been interest in surface vessel propulsion. I think it is safe to predict that all major surface vessels will one day be powered by fissioning nuclei.

Most of what I have said so far has applied chiefly to highly industrialized nations. Let us turn now to a few observations with reference to the less highly industrialized members of the world family of nations.

The economics and political facts of life have tempered our easy optimism about the benefits of atomic energy for all parts of the globe. We have found that even the highly industrialized nations are unable or barely able to construct commercially competitive plants in their own countries. It is probably unrealistic to expect nations with very limited man power and technical resources to cope immediately with this new technology. We can export reactors, in package deals, but for industrial power uses this will prove uneconomical unless there is a going industry to absorb large blocks of power.

Anti-Utopia Literature

Contemporary novelists have lived in an era that has seen many Utopian plans proposed—socialism, nationalism, technology, etc. They have reacted with disillusion when these programs have failed, with fear when they have not.

This view is explored in a paper entitled "A Literature of Disillusion—The Anti-Utopia of the Twentieth Century," by Eugen J. Weber, Assistant Professor of History at Los Angeles.

Professor Weber notes that "until recently Utopian schemes excited approval or disapproval but seldom, if ever, fear, or the bitter opposition that a feeling of immediate danger can beget."

Utopian novels of the past, he says, placed their settings out of time and space, in never-never land. And though they often criticized and satirized the ills and follies of existing societies, they were hopeful, in that they presented or implied alternate plans for salvation.

"But today's anti-Utopian novels, such as Huxley's *Brave New World*, Orwell's *1984*, Gheorghiu's *Twenty-Fifth Hour*, the works of Ray Bradbury and many others, convey a feeling that Utopia, a horrifying Utopia, is upon us, or just around the corner.

"The reality and immediacy of these anti-Utopian novels is but a reflection of
(cont. next page, col. 3)

Press Publications

Series

BULLETIN OF THE SCRIPPS INSTITUTION OF OCEANOGRAPHY: Wooster, Warren S., and Cromwell, Townsend: "An Oceanographic Description of the Eastern Tropical Pacific." Vol. 7, No. 3, pp. 169-282. Price, paper \$5.00.

BULLETIN OF THE SEISMOGRAPHIC STATIONS: Tocher, Don: "Earthquakes and the Registration of Earthquakes from January 1, 1957 to March 31, 1957." Vol. 27, No. 1, pp. 1-82. Price, paper 75 cents.

STATISTICS: Nefeu, J.: "Theorie des semi-groupes de Markov." Vol. 2, No. 14, pp. 319-394. Price, paper \$2.50.

ANTHROPOLOGICAL RECORDS: Baumhoff, Martin A.: "California Athabascan Groups." Vol. 16, No. 5, pp. 157-238. Price, paper \$1.50.

Books

Wallerstein, Ralph O., M.D. and Stacy R. Mettier, M.D.: *Iron In Clinical Medicine*. pp. xiv + 284. Price, cloth \$6.00.

Hutch, John A., M.D.: *The Ureterovesical Junction*. pp. xiv + 178. Price, cloth \$7.50.

Wadsworth, Frank W.: *The Poacher from Stratford*. pp. xiv + 174. Price, cloth \$4.50.

Professor Kidner Named U.C. Faculty Representative

By ED SCHOENFELD



Tribune photo

IN NEW JOB—Prof. Frank L. Kidner (left) newly-named faculty athletic representative at the University of California confers with Chancellor Glenn T. Seaborg (center) and Paul T. (Bud) Hastings, executive director of the ASUC.

One of the key men in the University of California's faculty is now officially allied with intercollegiate athletics on the Berkeley campus—thanks to a significant move made by Chancellor Glenn T. Seaborg.

Prof. Frank L. Kidner is the institution's new faculty athletic representative, appointed by Seaborg to fill the post he held for several years.

Kidner is an influential faculty leader, being vice chairman of the northern section of the U.C. Academic Senate. More than 1,200 faculty members from the Berkeley, San Francisco, Davis and Mt. Hamilton campuses compose the Senate.

At the Berkeley institution, Kidner is professor of economics and director of the bureau of business and economic research.

In accepting his new role, Kidner expressed great confidence in the future of intercollegiate athletics, especially now that the Athletic Association of Universities (California, USC, UCLA and Washington) has been formed.

"All of the participating institutions confidently expect the new association from July 1, 1959, forward will pro-

vide a sportsmanlike arrangement for the conduct of intercollegiate athletics," Kidner declared.

The professor said he shares with most of his colleagues the view that intercollegiate athletics, as well as intramural athletics, constitute an important part of the life of the university students.

Kidner said the faculty looks upon athletes as students—just like any other students.

He did not speak of hired gladiators or free loaders.

"I have had some very good students and some not so good among the athletes in my classrooms," Kidner said. "The same has been true among non-athletic students."

Although he was not an athlete in his undergraduate days at U.C., Kidner said he is an avid spectator, particularly at football and baseball games.

"I wasn't built to be a football player," he remarked.

Kidner stands 5-foot 4 inches.

Actually, he didn't have much spare time to compete in

athletics, working his way through school as a laborer and cook, among other jobs.

Kidner realizes he has a big pair of shoes to fill.

Chancellor Seaborg won great respect and praise from Pacific Coast Conference officials and newsmen for his actions as faculty representative.

He stepped into the job in midst of the PCC mess. A press spokesman at the numerous meetings Chancellor Seaborg handled the problem with considerable tact.

And, at the outset some wondered if he, as a Nobel Prize-winning scientist, wasn't misplaced in the spot.

The Daily Californian

MONARCH OF THE COLLEGE DAILIES

Berkeley, California, Friday, August 29, 1958

UC scientist to enter UN atom energy group

University of California scientists, from the Radiation Laboratory, Livermore and Berkeley, and the Los Alamos Scientific Laboratory in New Mexico, have been called upon by the Federal government to make a major contribution to the American showing at the United Nations Second International Conference on Peaceful Uses of Atomic Energy. The Conference is scheduled from September 1 to 13 for Geneva, Switzerland.

Some 113 scientists and technicians from the University laboratories, which represent an important segment of the nation's resources in nuclear brainpower, will take part at the request of the Atomic Energy Commission in America's effort to demonstrate her preeminence in using the atom for peaceful purposes. The contributions of the University scientists are completely financed by the Federal government.

University scientists will present scientific papers in a wide range of fields of atomic research, and they will operate exhibits of scientific equipment.

The Berkeley and Livermore contingents to the Conference will be led by Glenn T. Seaborg, Nobel Laureate and Chancellor of the Berkeley campus, and Edward Teller, Director of the Livermore Laboratory and an important contributor to the achievement of the release of thermonuclear energy. Each of the scientists will deliver lectures, Seaborg on "Recent developments in the field of transplutonium elements," and Teller on "Peaceful uses of fusion."

In addition to invited papers, Berkeley and Livermore scientists will contribute 14 other written papers to the Conference.

Hugh Bradner, physicist, Berkeley, is technical coordinator of the Berkeley and Livermore Radiation Laboratory contributions.

Twelve exhibits from the Radiation Laboratory, Berkeley and Livermore, and seven from Los Alamos are included in the American displays.

Six exhibits from the Radiation Laboratory and three from Los Alamos are in the huge display of the American effort to achieve controlled release of energy from the fusion of hydrogen nuclei. The Radiation Laboratory and Los Alamos, together with Princeton University are the major sites of American work in this field.

The Radiation Laboratory exhibits include four basic approaches to the problem of heating and containing a plasma (a gas of atomic nuclei and electrons in which, if a high enough temperature were attained, fusion and the release of energy could take place) in a magnetic bottle.

The four approaches are the pinch, the magnetic mirror machine, the astron, and the ion magnetron.

There are three pinch machines from the Radiation Laboratory. One is a linear pinch, historically one of the oldest of these devices, and the others are the tubular pinch and the homopolar variations. In all three the principle is the same but the techniques for achieving the pinch vary.

The magnetic mirror machine is a containment geometry consisting of an externally applied magnetic field, while the astron uses a "cylinder" of high speed electrons to contain the plasma, and the ion magnetron uses a combination of electric and magnetic fields for this purpose.

The Los Alamos fusion machines include the perhapseatron S-4, scylla, and a plasma accelerator machine known as P.A.M.

In addition to the Project Sherwood exhibits, Radiation Laboratory exhibits will include the following subjects: the production of

transuranium elements, antimatter and the detection of antimatter particles, the catalyzed nuclear reaction or "cold fusion," the data analysis of bubble chamber tracks; a radioisotopes detector for locating thyroid tumors; the use of radioisotopes in studying the mechanism of red cell production and hemoglobin formation; and an animated representation of photosynthesis.

Los Alamos exhibits in addition to Project Sherwood will include a helium-3 cryostat, a device for studying matter at low temperature; a computer exhibit, a demonstration of how the free neutrino was observed, and a new whole-body radiation counter recently developed at Los Alamos.

Wherever possible, the exhibits of the laboratories will be actually in operation, and where possible actual research will be carried on.

Fifty-nine faculty members of the University of California are members of the Academy, constituting nearly 10 percent of the membership. The University's delegation in the Academy is exceeded in number only by Harvard, with 61 members. The positions of Harvard and the University of California have remained the same for more than a quarter of a century, with the California institution having gained consistently in number over the years.

The Academy is a private non-profit corporation established during the Civil War by President Lincoln for the furtherance of science and to advise the Federal government upon request in scientific and technical matters.



Cal Gets First Ever Out-of-State Grid Whiz

Here's something I've been aching to write since the Sport Shop doors were first opened in the Fall of 1945:

California has landed an outstanding football player from out of the state.

True, out-of-staters have played on Cal football teams but they were entirely unknown before they entered school.

In fact, I doubt that Cal ever before has welcomed a prep whiz from beyond the borders of our state.

Strictly between us, the lad is Bob Wills, a 6-1, 184-pound half-back from Ishpeming, Mich. He apparently has everything. Speed? He was a 9.8, 21.6 sprinter on the Ishpeming track team. Agile? No finer cager ever came out of the Upper Peninsula. Grades? A—, sir. Touchdowns? Thirty-three in his three-year career. Moreover, he's a southpaw.

Then how did he ever escape from Michigan?

It wasn't easy, customers. Bob not only broke a fine high school romance but also the heart of Michigan State's Duffy Daugherty.

How did Cal ever land the fellow since the Big Ten considers ours as anything but a proper football climate?

Cal's Standards Impress Mother

Well, it just happens that his mother, Evelyn Wills, had always wanted to live in Northern California. Her interest was fanned by relatives in Modesto. In letters they had often chided her with "Why do you stay in Michigan and freeze in Winter when you could live in California?"

Her son, supposedly the property of Michigan State, visited the Modesto relatives this summer, and he was promptly sold on California as a place to live. But more than climate, Mrs. Wills wanted Bob to receive the best education possible. Even before Bob had visited Modesto, she had done some checking up. "I've talked with some well educated people I know," she told a friend of mine, "and I found out that the Big Ten schools just aren't in it with the University of California scholastically." Or words to that effect.

Bob and his 42-year-old father, who's also "Bob," were loading up their 1957 Pontiac today preparatory for departure tomorrow. They'll be here next weekend—unless Daugherty's state police pals apprehend them at the Michigan border.

Duffy Still Trying

California alumni now are looking for jobs for Papa Wills and Evelyn. If you can help let me know. Wills has worked both as a mechanic and driller. Evelyn isn't particular. Since she has no other children to take care of, she'd like some sort of a job to help young Bob through Cal.

Daugherty has been calling Evelyn about every day for the past two weeks, pleaded with her to change her mind.

"You really don't need Bob," Evelyn kept telling him. "Why, Mr. Daugherty, you already have more players than you can possibly use."

But Duffy never gave up. One of his assistants lives in nearby Marquette. He's dropped in several times the past month to paint the glories of Spartan football, tell how the great game is utterly unappreciated in upper UC echelons.

California coaches first heard of Wills' interest last winter when he wrote at the behest of his mother, a letter inquiring about his chances of admittance.

When Johnny Ralston, a Cal assistant coach, returned to Michigan this summer to visit his mother, Gwen Ralston, a teacher in Stephens, and his grandparents in Norway, he was accused on all sides of stealing the Upper Peninsula's best-ever athlete.

Johnny did motor over to Ishpeming to call on the Willises. A nobody in Michigan he had enrolled at California and, since the platoon system then gave little guys a chance, he had known the thrill of playing in the Rose Bowl. He was all set to do a selling job.

Ishpeming Has Done Better by Cal

But right away Bob, a handsome dark-haired 18-year-old, held up his hand. "You don't have to sell me on California," he said. "Mother already has done that. And after she and I visited Berkeley recently, I've been as enthusiastic over Cal as she. Don't worry. Nothing can stop us from going to the Coast. Dad had rather hoped I'd go to Michigan State, but he's convinced now that I've a better chance of getting a job in California."

Before visiting the Willises, Ralston had discussed Bob with some 10 high school coaches. And everyone had told him they'd never seen anything like Wills before in the Upper Peninsula.

All mentioned that he was a terrific basketball prospect but they agreed it would be better for him to concentrate on football and track at Cal since the seasons don't overlap. Actually, the kid is good at anything he tries. He took up golf this summer, and soon was shooting in the low 80s. Moreover, he's regarded as a baseball natural but passed up the sport in high school since it conflicted with track.

Good as Bob is, Ishpeming has made still a greater contribution to the UC. You see, Chancellor Glenn T. Seaborg was born (1912) and reared (partially) in the little mining town. Seaborg's father also was born in Ishpeming.

00695

August 29, 1958

Academy scheduled

The National Academy of Sciences, will hold a meeting on November 6, 7 and 8 on the campus of the University of California, Chancellor Glenn T. Seaborg and Dean Kenneth Pitzer, of the College

of Chemistry, announced Wednesday.

The meeting is the regular fall gathering of the organization of America's leading scientists. Another annual meeting is held each spring at the Academy's headquarters in Washington, D.C.

This will be the third time the Academy has held a meeting on the Berkeley campus, earlier occasions being in 1930 and in 1948.

Pitzer is chairman of the arrangements committee for the meeting. Other members of the committee, all of the Berkeley faculty, include Raymond T. Birge, professor of physics, emeritus, Griffith C. Evans, professor of mathematics, emeritus, Joel Hildebrand, professor of chemistry, emeritus, Wendell M. Stanley, director of the Virus Laboratory, Curt Stern, professor of zoology, and Francis J. Turner, professor of geology. Hugh L. Dryden, home secretary of the Academy, is also a member of the committee.

At their meeting, the scientists will present research papers, present a public lecture (still to be announced) and make a tour of the accelerators of the Radiation Laboratory.

Ike Orders Award To Honor Lawrence

Berk. Gazette

8/30/58

NEWPORT, R.I., Aug. 30 (AP)—President Eisenhower today ordered creation of an annual Ernest Orlando Lawrence award to honor the University of California atomic scientist and Nobel Prize winner who died this week.

At his vacation headquarters, Eisenhower approved a proposal by John A. McCone, chairman of the Atomic Energy Commission, that such an award be given for especially meritorious achievements in the broad field of atomic endeavor.

Lawrence was director of the Radiation Laboratory at the University of California. He was stricken ill while serving as a member of the US delegation at Geneva for talks on how to police a ban on nuclear weapons tests. He died in Palo Alto last Wednesday.

"I strongly agree that the memory of Dr. Lawrence as well as his great contributions, should be commemorated," Eisenhower wrote McCone in instructing him to set up the award.

In a letter to the President, McCone said the award can be established by Eisenhower or the AEC without new legislation.

McCone said the commission already has authority to make monetary grants from time to time for especially meritorious contributions.

James C. Hagerty, White House press secretary, said in reply to questions that the annual award probably would be in the range of \$50,000. He added that details will be worked out later.

In Berkeley a memorial service was held today for Dr. Lawrence.

Dr. Glenn T. Seaborg, University chancellor, said the Radiation Laboratory's participation in the second Geneva Conference on Peaceful Uses of Atomic Energy was a tribute to Dr. Lawrence "in a real sense."

He said 53 scientists from the laboratories at Berkeley and Livermore would attend the Geneva conference opening Monday.

"These works for peace were the real joy of Dr. Lawrence, who was a major participant in the first Geneva Atoms for Peace Conference."

U.C. Atom Greats To Star at Geneva

University of California scientists attending the International Atoms for Peace Conference, which opens tomorrow in Geneva, are expected to steal the limelight with a group of exciting new reports on methods of taming the incredible fury of the H-bomb for peaceful uses.

Among the local scientists attending the conference, which will include delegates from 70 nations, will be Dr. Glenn T. Seaborg, new Berkeley Chancellor and famous Nobel Prize winning atomic chemist, and Dr. Edward Teller, director of the Livermore Radiation Laboratory and reputed "father" of the H-bomb.

The U.C. delegation will be headed by Dr. Hugh Bradner, Berkeley Radiation Laboratory physicist.

MAJOR INTEREST

While the two-week conference will hear several thousand reports on all aspects of atomic energy—more than 700 of which will be given by U.S. scientists—the greatest interest has already been shown in new developments on achieving sustained fusion reactions.

For, according to most international observers, in this field exists the most promising resource known which will be capable of solving a great share of mankind's most depressing economic and political ills.

Chief among the scientific centers throughout the world where thermonuclear research for peaceful purposes is going forward are the U.C.-operated laboratories of the U.S. Atomic Energy Commission in Berkeley, Livermore and at Los Alamos, N.M.

NEW TECHNOLOGY

Achievements in these laboratories to date have so excited AEC officials that they recently reported to Congress that the "research of the past five years has resulted in the creation of a whole new technology."

The physical conditions necessary to achieve fusion have been defined, the report stated, and several promising methods of accomplishing self-sustained fusion have been formulated.

A model of the first fusion device for which calculations predict economical production of power in a large-scale reactor is among the U.C. contributions to the U.S. exhibit.

LIVERMORE FEAT

News dispatches from Geneva report the model of the device, called "Astron," was shown at a preview of the U.S. exhibit. It was designed by Dr. Nicholas Christofilos of the U.C. radiation laboratory at Livermore, who also is in Geneva.

It involves a revolutionary departure from earlier reactor designs and requires only a small amount of electricity. Experts said it would take at least several years before a large-scale model could be built.

A wall of electrons is created in the "Astron" to hold the tremendously hot hydrogen gas in place and prevent vaporization of the reactor. A weak magnetic field holds the electrons in place.

WEIRD 'GADGETS'

The U.C. research, conducted under the code name "Project Sherwood," involves a number of weird contraptions.

At Los Alamos, for example, a bevy of these machines go by such curious names as "Scylla," "Perhapsatron S-4" and "PAM."

All of these machines, designed to produce the first sparks of a laboratory-controlled hydrogen reaction—the identical glow of the sun—will be exhibited during the Geneva conference.

In fact several members of the AEC have claimed that American scientists are on the verge of producing the formula for a fusion reactor that will operate on the almost unlimited resources of ocean's stores of heavy hydrogen.

GREAT DAY AHEAD

When that day comes, this is what it will mean:

1—Gross fuel costs for electric power plants will be shaved to 3½-thousandths of a mill per kilowatt-hour, which compares with California's fossil-fuel costs today of about 4 mills, or four-tenths of a cent per kilowatt hour.



UC DELEGATES—Dr. Hugh Bradner (top) heads the University of California delegation to atoms-for-peace conference at Geneva. Others are Dr. Glenn T. Seaborg (center) and Dr. Edward Teller.

2—There is an estimated 500 million million tons of reasonably accessible deuterium in the surface waters of the world, which could produce 1,000 million million kilowatt years of electric power. America's current annual electric power consumption is about 72,000,000 kilowatt years.

3—A hydrogen reaction plant cannot explode, and runaway or other risk dangers are about the same as that for present-day fuel-oil electric generating plants.

4—Hydrogen reactors will not produce long-lived radioactive byproducts, such as strontium-90.

5—Electricity can be obtained directly from a fusion reactor without the high efficiency loss that occurs when a liquid coolant is used to transfer heat energy to huge turboelectric generators from the reactor core in the form of steam.

Other U.C. scientists attending the Geneva conference are: Dr. C. M. Van Atta, director of the Sherwood Project; Dr. Cornelius Tobias, Dr. Geoffrey Chew and Dr. Stanley Thompson of Berkeley; Drs. Jacob Benveniste, Sidney Fernbach, Gerry Johnson, Harry Reynolds, Sterling A. Colgate, Richard F. Post, Charles Wharton and Harold Brown, all of Livermore.

September 2, 1958

Students Will Find Some Changes at UC

Registration of an expected 19,748 students will begin September 15 at the Berkeley campus of the University of California.

The incoming students will find there have been some changes made—in administration, in facilities and in costs.

There will be a new university president, Clark Kerr, and a new campus chancellor, chemist Glenn T. Seaborg. There will be a new

university vice-president, agriculturist Harry R. Wellman, and two new vice-chancellors, philosopher Edward W. Strong and psychologist Alex C. Sheriffs.

The students will find two blocks south of the campus half built-up toward residence halls designed to hold 1696 students after completion by registration time next year.

They will find a four-story,

half-million dollar anthropology and art building half completed near College avenue and Bancroft way, and a \$1.5 million science and mathematics building half finished at Hearst Mining Circle.

They will find old buildings going down on two blocks west of Robert Gordon Sproul Hall, where a mammoth \$11.6 million student center is to be built.

Just across from the west

gate, the incoming UC students will find a \$4 million State office building almost finished.

The students also will find the price of education has gone up a bit:

The incidental fee, up from \$50 to \$60; the nonresident fee, up from \$150 to \$200; late registration, \$10 instead of \$2; the compulsory student fee, \$6 instead of \$3.

Registration will take place September 15, 16 and 17.

U.C. Scientists Report on Californium

University of California scientists have obtained weighable amounts of Californium, the rare, man-made element No. 98.

They made the announcement today in Geneva at the Atoms for Peace Conference, according to the Associated Press.

They have precious little of the element — only six-hundredths of one-millionth of a gram. Twenty-eight grams make an ounce.

But the tiny packet is at least a \$1,000,000 baby. That's about what it cost to make, said Dr. Glenn T. Seaborg, Nobel Prize chemist of the University of California.

FIRST REPORT

Dr. Seaborg announced discovery of the element from U.C. atom smashers on March 17, 1950. His announcement came little more than a month after his discovery of element 97 called "Berkelium" after the City of Berkeley.

He and associates this spring succeeded in isolating about four times as much Berkelium. The two probably cost several million dollars to create, he told newsmen at the Atoms for Peace Conference.

A formal report on Californium was presented by Drs. S. G. Thompson, B. B. Cunningham and M. L. Muga, Seaborg's associates.

OAKLAND TRIBUNE

September 6, 1958

Neither element existed on earth before the atomic age. They are made by building up heavier elements from Plutonium in an atomic pile. It took six years to make the pinspeck of Californium at Arco, Idaho.

The Californium is colorless, and highly explosive or fissionable, spontaneously shooting out neutrons, Dr. Seaborg said. It could make a super-bomb, except for the job of ever getting enough of it.

AID TO RESEARCH

Its main value will be in adding to knowledge of nuclear and atomic physics, now that scientists are getting enough of it to study and examine.

In pre-atomic age days, there were only 92 known elements. Now there are 102, and "We are working on finding No. 103," Dr. Seaborg said.

Some scientists hope that elements up to 108 can be discovered. But they will be so highly radioactive that they would disappear within a split second.

The Californium described today is an isotope known as Californium-252. In two years, half of it will break down and be gone.

It has a cousin, Californium-254, which is believed to be created in super-novae, the gigantic death explosions of stars.

One scientific theory is that Californium may have existed on earth for a few fleeting minutes "in the beginning" when matter was formed.

BERKELEY GAZETTE - September 5, 1958

Radiation Lab Isolates New Space Element

The isolation of the synthetic element, californium, element 98, produced by a process akin to one occurring in exploding stars and hydrogen bombs, has been achieved by a group of scientists in the University of California Radiation Laboratory working on a continuing fundamental research program of the Atomic Energy Commission.

The research was reported today in Geneva, Switzerland, to the Second International Conference on Peaceful Uses of Atomic Energy and at the same time on the Berkeley campus of the University.

HEAVIEST ELEMENT

Californium is the heaviest element ever concentrated in large enough quantity to be visible and weighable. The Berkeley scientists — University of California scientists have discovered or taken part in the discovery of all elements heavier than uranium, from 93 through 102—have hopes of so concentrating only one more element, element 99.

The isolation of californium is especially important because it may be potentially the most useful element heavier than uranium, with the exception of plutonium, element 94, the atomic energy fuel. The potential derives from the fact that one isotope of californium decays partly from spontaneous fission, making the element an excellent neutron source and a model for plumbing previously unapproachable mysteries of the fission mechanism.

The scientists who performed the isolation, a major scientific

step, were Stanley Thompson and B. B. Cunningham, and their assistants Ray Gatti and Llad Phillips, members of the Radiation Laboratory's Chemistry Group, which is directed by Dr. Glenn T. Seaborg, Nobel Laureate and chancellor of the Berkeley campus. Drs. Thompson and Seaborg participated in the discovery of element 98 in 1950.

NOT ON EARTH

Californium does not exist naturally on earth, although it has been postulated to exist in Super-Novae, or exploding stars, since its discovery in cyclotron bombardments. Previously, only tracer, invisible quantities of the element have been available.

The californium sample is the smallest amount of material from which macroscopic properties of a material have been determined.

The ability of scientists to make such studies with such minute amounts of material is due to a large extent to the pioneering ultramicrochemical techniques developed by Dr. Cunningham. So tiny are Dr. Cunningham's test tubes, beakers and other equipment that they must be manipulated under a microscope.

How UC Scientists Built Supply of Rarest Element

By David Perlman

The world's only piece of a powdery white new element called californium—a piece big enough to see and weigh and study—has been produced by University of California scientists.

The substance, far heavier and 1000 times more radioactive than uranium, is so rare it doesn't exist naturally on earth at all.

The bit of californium now isolated took six years and a million dollars to make, and all there is weighs only a milligram—one thirty-millionth of an ounce. But even that tiny amount represents a major victory in fundamental nuclear science.

With an atomic number of 98 californium is expected to prove immensely valuable to researchers trying to learn precisely what happens to atoms during nuclear fission.

MADE IN REACTOR

It was produced in an atomic reactor by a process that reproduces the fantastic transmutation of elements known to occur in the hydrogen bomb and in the hot cores of exploding stars called supernovae. If californium ever existed in our solar system before, it was billions of years ago when the sun and earth were formed.

Isolation of the first tangible quantity of californium was announced by Dr. Stanley Thompson and Dr. B. B. Cunningham of the UC Radiation Laboratory and their assistants, Ray Gatti and Llad Phillips.



DR. STANLEY THOMPSON
One of UC team

Thompson and Dr. Glenn T. Seaborg, now UC chancellor, first tracked down a few elusive atoms of the hitherto unknown element with the Berkeley cyclotron in 1950. Now they have enough to work with.

UNSTABLE ATOMS

Perhaps the most intriguing property of californium, according to Thompson, is the fact that one of its various forms undergoes spontaneous fission. In other words, the atoms of one californium isotope are so unstable their nuclei break in two on their own, and fire off energetic particles called neutrons in the process.

Study of this spontaneous splitting will make many of the mysteries of the nuclear fission mechanism approach-

able for the first time. The element can now be examined spectrographically, and its nuclei explored under extremely low temperatures when the cold atoms are quiescent, like a patient under anesthesia.

Studying the element itself is a major feat. So small is the available quantity of californium that it can only be examined with ultramicroscopic techniques developed by Cunningham. Test tubes, beakers and other equipment used to handle it are so small they must be manipulated under a microscope.

When californium can be produced in large enough quantities it will also be an excellent research source of neutrons, and may even prove practically valuable in such projects as radioactive exploration of oil fields.

It could make a super-bomb, but no one would try to manufacture that much.

SIX-YEAR PROCESS

The manufacture of the first bit of californium was accomplished by the Berkeley men at an Atomic Energy Commission testing reactor at Arco, Idaho. A quarter ounce of plutonium was placed in the reactor six years ago and has been steadily bombarded with neutrons ever since.

A similar bombardment takes place in a flash during the boiling burst of matter in an H-bomb or the even larger scale explosion of a supernova.

Plutonium 239, the major energy source of atom bombs, has an atomic nucleus made up of 94 protons, each with a positive electric charge to balance the negative charges of its 94 circling electrons. The nucleus of plutonium 239 also contains 145 neutrons, minute particles with no electric charge at all.

NEUTRONS ABSORBED

In the testing reactor at Idaho the US scientists steadily bombed the plutonium nuclei with unusually large quantities of neutrons. Over the years the plutonium nuclei absorbed extra neutrons, one at a time.

As the nuclei gradually fattened themselves by capturing neutrons, some of the neutrons changed to protons and the plutonium was transmuted step by step, getting heavier and heavier. First it changed into the element americium, then to curium, then to berkelium and finally into californium.

The Berkeley scientists say it will be possible to manufacture only one element heavier than californium—number 99, called einsteinium—although several such elements are known to exist.

RAPID DECAY

This is because the super-heavy elements are so unstable they undergo radioactive decay faster than they can be created. Their nuclei keep breaking up, emitting particles and sliding back down the periodic table of elements until they become lighter and more stable.

About two-thirds of the californium now isolated decays fairly rapidly, so that half of it is gone every two years. But some of it, decaying by spontaneous fission, has a half life of 70 years—long enough for plenty of detailed study.

Thompson and Cunningham reported their epochal work in a paper released last week at Berkeley and presented to the International Atoms for Peace conference in Geneva, Switzerland.

U. S.-SOVIET BOND IN SCIENCE URGED

American at Geneva Parley
Asks Close Ties in Work
on Artificial Elements

By JOHN W. FINNEY

Special to The New York Times.

GENEVA, Sept. 10—A prominent United States scientist proposed tonight that American and Soviet scientists collaborate as modern-day alchemists in the creation of new elements.

The proposal was made by Dr. Glenn T. Seaborg, Nobel prize-winning chemist at the University of California, who has been a pioneer in the search for artificial elements of matter produced by atomic transmutation.

Dr. Seaborg's suggestion was another step in the general movement toward East-West scientific cooperation growing out of the Second United Nations International Conference on Peaceful Uses of Atomic Energy. In fact, his proposal was directly prompted by the exchange of information taking place at this two-week meeting of scientists of sixty-two nations.

In an evening lecture before the scientists, Dr. Seaborg observed that since coming to the conference he had learned of the interesting work being done in Moscow in the creation and identification of artificial elements by a team of scientists headed by Dr. G. N. Flerov.

Element 102 Produced

In some of their experiments, he said, the Soviet scientists have apparently produced, but not identified, an artificial element with an atomic number of 102. The same element was created at the University of California's radiation laboratory at Berkeley earlier this year.

"It appears that the Moscow work complements the Berkeley work nicely," Dr. Seaborg said, "and it is hoped that we can proceed from here on in this field of investigation with close cooperation between the two laboratories."

Another move toward continuing international scientific cooperation was made in the field of atomic reactor development.

At a technical meeting on reactor physics—one of many highly technical symposiums going on at the conference—scientists of several nations agreed they should meet again within a few months to continue their exchange of information.



SEEKS COOPERATION:
Dr. Glenn T. Seaborg, who proposed that U. S. and Soviet scientists collaborate in creating new elements.

Dr. Boria Hulubel of Rumania, chairman of the meeting, said afterward the scientists taking part in the reactor physics discussion came to the common conclusion that their collaboration should not end with the atoms-for-peace conference.

Further Parleys Requested

Therefore, he said, the physicists are relaying a request to conference officials to arrange for periodic meetings in the future, perhaps under auspices of the International Atomic Energy Agency.

Their request pointed up two general conclusions emerging from this conference:

1. The walls of secrecy around atomic energy have been lowered to a point where international scientific cooperation is not only possible but almost inevitable.
2. The present framework of atoms-for-peace conferences is becoming too broad and large for useful scientific exchange of information, and the scientists now want conferences on more specialized subjects held at more frequent intervals.

In his lecture, Dr. Seaborg predicted that it would be possible to produce and detect perhaps six more synthetic elements as a result of what he called "modern-day alchemy."

10 New Elements Known

These elements are not found naturally on the earth but are produced by transmutation, through prolonged atomic bombardment, of naturally occurring uranium, which has an atomic weight ninety-two. Thus far ten of these man-made "transuranium elements" have produced—neptunium, plutonium, (discovered by Dr. Seaborg in 1940), americium, curium, berkelium californium, einsteinium, fermium, mendelevium and element 102, whose first discovery and name is still a matter of scientific dispute.

Dr. Seaborg said synthetic elements with atomic numbers up to 110 may still be produced and identified. He said, however, that by the time elements 104 and 105 are reached, the artificial substances lifetime will be so short that normal chemical identification will become difficult.

Production of these artificial elements, either by bombardment with neutrons in a reactor or with ions produced in an accelerator, is extremely limited. For instance, with one reactor now available in the United States it takes ten years to produce one-thousandth of a gram of californium.

Because of the scientific interest over use of these elements in research into atomic structure, Dr. Seaborg suggested that one way to increase their production would be to manufacture them in thermonuclear explosions conducted under "proper auspices."

September 11, 1958

U.S., Soviet Elements Study Urged

GENEVA, Sept. 10 (AP)—
Dr. Glenn Seaborg tonight
proposed joint research with
the Russians to re-create
atoms of chemical elements
which perhaps died soon
after the universe was born.

This quest is to create six
new kinds of atoms. They
would be the chemical ele-
ments from Nos. 103 to 108,
said Seaborg, Nobel-prize-
winning chemist who is chan-
cellor of the University of
California in Berkeley.

He said the Russians ap-
parently have succeeded in
making some atoms of ele-
ment No. 102, as the Sea-
borg team also has done.

Before World War II, only
92 chemical elements were
known. But A-bomb work
pushed this up to 96, includ-
ing plutonium for bombs,
which is element No. 94.

Scientists now are mak-
ing infinitesimal dabs of
elements 97 through 102,
and hope eventually to get
up to No. 108.

Most of these atoms are so
intensely radioactive, how-
ever, that they disintegrate
within minutes, hours or
days.

By one theory, these ele-
ments were created when the
universe was born in a gi-
gantic explosion some seven
billion years ago or more.
Then they all disappeared
and have since been "dead."

Five months ago, Sea-
borg and associates created
and identified some atoms of
element 102, which has not
yet been given a name.

Seaborg, speaking to the
Atoms-for-Peace Conference,
said Dr. G. N. Flerov and as-
sociates in Moscow have
produced some atoms which
may be exactly like the
atoms made in California in
a linear accelerator.

September 12, 1958

Cal Readies Big Welcome For Michigan Super Prep

Bob Wills, Jr., an 18-year-old from Ishpeming, Michigan, with a set of athletic references that would do credit to an Ernie Nevers or a Jim Thorpe, is ready to register as a University of California freshman next week.

The 6-foot, 180-pound Wills was an All-Michigan halfback last fall, averaged 18 points a game as a basketball forward and has run a :09.8 century and a 21.6 furlong.

He has been on the Berkeley campus for several days, along with other prep gems who will enroll next week.

California, like other schools, makes no announcement concerning potential frosh athletes until they have actually registered, but word of Wills' presence leaked out yesterday.

The son of a coal miner, Wills was an A-minus student at Ishpeming High. He wrote to California last spring asking about scholarship arrangements for athletes. After investigating, California was happy to offer him a grant-in-aid and a campus job. He visited the campus in July.

Wills' parents have moved to Berkeley also.

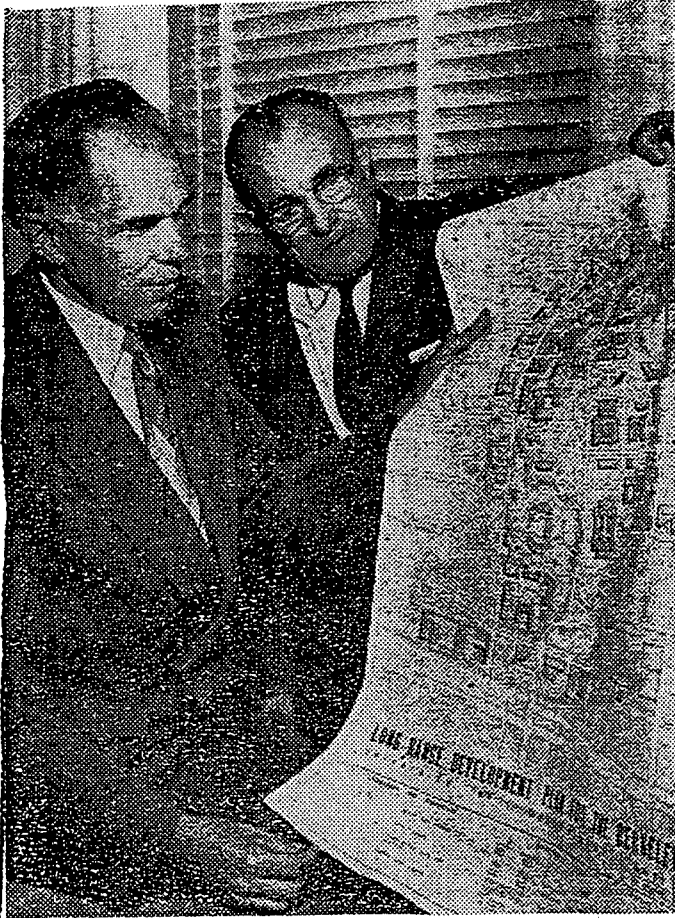
Although head coach Pete Elliott is a University of Michigan alumnus, that apparently had nothing to do with young Wills' choice of California. His mother, he said, had long wanted to move to a warmer climate, and leaned toward this area since a relative had moved to Modesto some years ago.

(Chancellor Glenn Seaborg of California is also a native of Ishpeming, but it is believed that this had no connection with Wills' appearance on the campus either.)



At New York's Waldorf-Astoria, a Nobel Prize winner's tablecloth formulas give Jinx Falkenberg an informal lesson in chemistry. Her teacher: Glenn T. Seaborg of the University of California. Tex and Jinx devoted almost the entire hour of their radio show "New York at Night," to the interview with Seaborg

C&EN SEPT. 23, 1957



Tribune photo

REDEVELOPMENT PLAN FOR U.C.—Chancellor Glenn T. Seaborg (left) and State Director of Finance T. H. Mugford discuss plans to enlarge Berkeley campus. It would be financed under Proposition 3.

Prop. 3 OK Held Essential to State

BERKELEY, Sept. 24—State Director of Finance T. H. Mugford today held failure to pass Proposition 3, which would provide a \$200,000,000 institutional construction program, would mean a serious decline in California's stature as one of the leading and progressive states of the union.

Mugford yesterday conferred with University of California Chancellor Glenn T. Seaborg on provisions of university expansion under the proposed program.

Seaborg said his major problem as chancellor is trying to find space for students on the university campuses.

The measure would give 75 per cent of the money to the university and state colleges with the remainder going to correctional institutions, mental hospitals, youth authorities, veterans homes and other institutions.

Mugford said a bond issue is necessary to get the required money "until we can get out of the recession and maintain a balanced budget."

Raising that sum by taxation would mean excessively high rates, he held.

The measure has endorsement of both political parties and there is no organized opposition.



Edwin M. McMillan
Director, Radiation Laboratory

Seaborg on McMillan

Of McMillan's appointment to succeed the late Ernest O. Lawrence as Director of the Radiation Laboratory, Chancellor Glenn T. Seaborg of Berkeley said:

"The University is fortunate in already having on its staff so highly qualified a scientist as Professor McMillan. He is a man of great stature, intellectually and in the world of science. He was a close friend, colleague and advisor to Professor Lawrence, and there is no one more intimately acquainted with the program and ideals of the Radiation Laboratory. It is worthy of note, too, that this great scientist made discoveries that permitted some of the most important exploitation of the potential of Professor Lawrence's cyclotron."

McMillan is a member of the important General Advisory Committee of the Atomic Energy Commission. An Associate Director of the Radiation Laboratory since 1954, he was appointed two months ago to the post of deputy director.

McMillan is credited with swinging open two huge gateways to nuclear knowledge.

Co-Discoverer of Neptunium

In 1940, after years of tantalizing failure by some of the world's most able scientists, McMillan, with P. H. Abelson, now of the Carnegie Institution in Washington, D.C., succeeded in discovering neptunium, element 93.

McMillan also found some preliminary evidence for element 94, before he was called away to national defense work in the fall of 1940. Element 94 later was positively identified by Seaborg and his colleagues, and was named plutonium. McMillan's achievement set the stage for the exploration and discovery of a whole family of transuranium elements, now reaching up to element 102, by University scientists.

McMillan and Seaborg shared the Nobel Prize in 1951 for their work on the transuranium elements.

The new director's second very important achievement was the discovery of a principle, called the "theory of phase stability," which paved the way for present researches in ultra-high energy physics, in the energy ranges of multi-hundreds and billions of electron volts.

Before World War II, with knowledge then available, it was believed that heavy particle accelerators of the cyclotron type would be limited to an energy range of about 100 million electron volts.

McMillan's theory, which he developed in 1945, overcame these limitations. His principle was applied in 1946 to the 184-inch synchro-cyclotron at Berkeley, which yielded the first particles in the multi-hundreds of millions of electron volts (MEV), and resulted in the first laboratory production of the important nuclear particles called mesons.

In the fall of 1942, he helped organize the Los Alamos Scientific Laboratory, where he was in charge of the early development of the uranium and plutonium type bombs.

The scientist came to Berkeley as a National Research Fellow in 1932, the year he secured his Ph.D. at Princeton. In 1934 he became a Research Associate on the physics staff. He was promoted to Instructor in Physics in 1935, Assistant Professor in 1936, Associate Professor in 1941, and Professor in 1946.

OAKLAND, CALIFORNIA, WEDNESDAY, SEPTEMBER 24, 1958

Educators to Help Inaugurate Kerr

Presidents of 43 Universities To Gather in Berkeley Monday; Varied 3-Day Program Planned

BERKELEY, Sept. 24. — Presidents from at least 43 foreign and American universities will congregate in Berkeley Monday, to participate in the inauguration of University of California President Clark Kerr.

More than 200 other representatives from institutions as old as Oxford University, founded 843 years ago, and as young as the 10-year-old Free University of Berlin, also will join in the celebration.

Berkeley's three-day program of academic, musical and dramatic events is part of the most extensive inauguration ever planned for a university president.

The celebration period will extend from tomorrow through Oct. 10 and will include functions on seven of the eight U.C. campuses.

Kerr will be inaugurated at twin ceremonies—at Los Angeles Saturday and in the Greek Theater on the Berkeley campus Monday.

Among the 43 presidents who already have accepted invitations to participate are Soedjono Poesponegoro, University of Indonesia; Lee A. DuBridge, California Institute of Technology; Nathan M. Pusey, Harvard University; W. V. Houston, Rice Institute; Rufus Harris, Tulane University; O. Meredith Wilson, University of Oregon; Albert Ray Olpin, University of Utah; C. Clement French, State College of Washington, and Charles J. Armstrong, University of Nevada.

Delegates will represent such ancient institutions as the University of Glasgow, University of Copenhagen, University of Edinburgh and the University of Dublin.

Opening event in the inauguration will be the presentation of the Trilogy of Aeschylus in the Greek Theater at 3 p.m. Thursday and Friday and at 9 a.m. and 3 p.m. Saturday.

The San Francisco Opera Company's current production of "Medea" will be staged in the Greek Theater at 2 p.m. Sunday, with soprano Eileen Farrell in the title role.

A concert by the Griller Quartet will be presented at 8:30 p.m. Saturday in the Hertz Memorial Hall.

The formal investiture ceremony will begin at 2:30 p.m. with Berkeley Chancellor Glenn T. Seaborg presiding. The principal address will be delivered by President Kerr.

Greetings will be extended by Governor Goodwin J. Knight, regents chairman Donald H. McLaughlin, alumni president Mortimer Smith, associated students president William Strickland, academic senate vice-chairman Frank Kidner and Stanford University President Wallace Sterling.

The university chorus, orchestra, glee club and treble clef will provide music.

SAN FRANCISCO CHRONICLE

September 25, 1958

U.C. Lectures Set to Honor Dr. Lawrence

BERKELEY, Sept. 25—The University of California today established the Ernest O. Lawrence Memorial Lectures in honor of the Nobel scientist who died last month.

Chancellor Glenn T. Seaborg said the lectures will deal with subjects "at the forefront of human knowledge" and will be open to the public.

The talks will be supported by the Ernest O. Lawrence Memorial Fund, set up at the death of the former director of the U.C. Radiation Laboratory.

In approving the lectures, the Regents pointed out that the fund now contains \$10,000 and additional contributions will be needed to carry out the program.

00708

September 29, 1958



Edwin M. McMillan

Director, Radiation Laboratory

Seaborg on McMillan

Of McMillan's appointment to succeed the late Ernest O. Lawrence as Director of the Radiation Laboratory, Chancellor Glenn T. Seaborg of Berkeley said:

"The University is fortunate in already having on its staff so highly qualified a scientist as Professor McMillan. He is a man of great stature, intellectually and in the world of science. He was a close friend, colleague and advisor to Professor Lawrence, and there is no one more intimately acquainted with the program and ideals of the Radiation Laboratory. It is worthy of note, too, that this great scientist made discoveries that permitted some of the most important exploitation of the potential of Professor Lawrence's cyclotron."

McMillan is a member of the important General Advisory Committee of the Atomic Energy Commission. An Associate Director of the Radiation Laboratory since 1954, he was appointed two months ago to the post of deputy director.

McMillan is credited with swinging open two huge gateways to nuclear knowledge.

Co-Discoverer of Neptunium

In 1940, after years of tantalizing failure by some of the world's most able scientists, McMillan, with P. H. Abelson, now of the Carnegie Institution in Washington, D.C., succeeded in discovering neptunium, element 93.

McMillan also found some preliminary evidence for element 94, before he was called away to national defense work in the fall of 1940. Element 94 later was positively identified by Seaborg and his colleagues, and was named plutonium. McMillan's achievement set the stage for the exploration and discovery of a whole family of transuranium elements, now reaching up to element 102, by University scientists.

McMillan and Seaborg shared the Nobel Prize in 1951 for their work on the transuranium elements.

The new director's second very important achievement was the discovery of a principle, called the "theory of phase stability," which paved the way for present researches in ultra-high energy physics, in the energy ranges of multi-hundreds and billions of electron volts.

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The Daily Californian

MONARCH OF THE COLLEGE DAILIES

169

Berkeley, California, Tuesday, September 30, 1958

N

Kerr becomes 12th UC president

Scholars from whole world honor new University head in colorful ceremonies here

By PAT CECIL and SHEILIA BOYER

A president was inaugurated yesterday.

In impressive ceremonies at the Greek Theatre, Clark Kerr became the 12th president of the University of California.

Officially assuming a post held by Robert Gordon Sproul for 28 years, Kerr now holds the highest of all honors conferred by the Regents of the University.

Entering the Greek Theatre with Sproul on his right, President Kerr asked, "Does this bring back memories?" "It certainly does," the President Emeritus said.

Following the singing of "Hail to California," members of University graduating classes from 1891 filed into the Theatre, to the music of the University orchestra playing "War march of the priests," from Mendelssohn's "Athalia."

In the raiment of their scholastic achievement, scholars and learned persons from every continent flowed into the theatre, before colorful academic flags, honoring the new President. The academic procession, led by Frank Kidner, University marshal, colors and guard began at 2:15 p.m. at the Campanile Esplanade and wound its way up the hill escorted by members of the senior guard of honor.

Donald H. McLaughlin, chairman of the Regents, extended his greetings and those of Governor Goodwin Knight who was unable to attend the inauguration ceremonies.

"In selecting Clark Kerr for President of the University in these anxious yet hopeful times," McLaughlin said, "we are certain that we found a leader who will face the formidable problems ahead of us with courage and firmness."

The message from the Regents carried "the esteem and warm friendship of every member and complete confidence that the University will advance to new greatness" under Kerr's guidance.

Frank L. Kidner, professor of economics and business administration, spoke on behalf of the Academic Senate and outlined Kerr's task as "formidable," since the number of students enrolled in the University's campuses "will double in the first 10 years of his administration."

"This is a great day, a great state and a great University," Mortimer Smith, president of the California Alumni association, said, as the crowd cheered in agreement. "It is the progress of the mind that is vital on this campus and that progress is coupled here with the competent leadership of President Clark Kerr," he said.

Bill Stricklin, president of the ASUC, described the great progress in student affairs during Kerr's administration as Chancellor. He sketched the intellectual development of the student, the expansion of student government, the development of the whole individual and the improvement of student living conditions.

"This inauguration means we will now share Dr. Kerr with the other campuses—we share a great gift," Stricklin concluded.

Glenn T. Seaborg, new Chancellor of the Berkeley campus, though not scheduled to speak on the program, "found himself in a very advantageous position to do so" and expressed his sincere congratulations to Kerr, stressing his adherence to principles.

J. E. Wallace Sterling, president of Stanford university, delivered a message on behalf of the universities, colleges, learned societies and foundations represented at the inauguration. "Occurrences of this sort are like weddings—they mark the beginning of new life experiences. Friends of the family are present and dressed in appropriate clothing," Sterling said.

"The only difference," he continued, "is that no one ever asks if the two principals should be joined together. The marriage is already a published and welcome fact."

"The Universities have been placed in the spotlight from fears engendered by a sputnik . . . We are quick to claim and proud to enjoy the highest standard of living in the world, and yet, we are guilty of starving the goose which has laid the golden egg," Sterling said.

In conclusion, Sterling said he was "glad to see one Scot succeed another as the University's president."

Kerr, following his introduction by Donald H. McLaughlin, summarized the development of the University through each of its previous presidents. Commenting especially upon Robert Gordon Sproul, President Emeritus, he said that the test for the president of this University will be what he builds on the foundation established by the past and what he contributes in the creation of wider opportunities for the future.

"Robert Gordon Sproul, you have passed your stern test, summa cum laude . . . now I must assume the responsibilities which my predecessors have discharged so well."

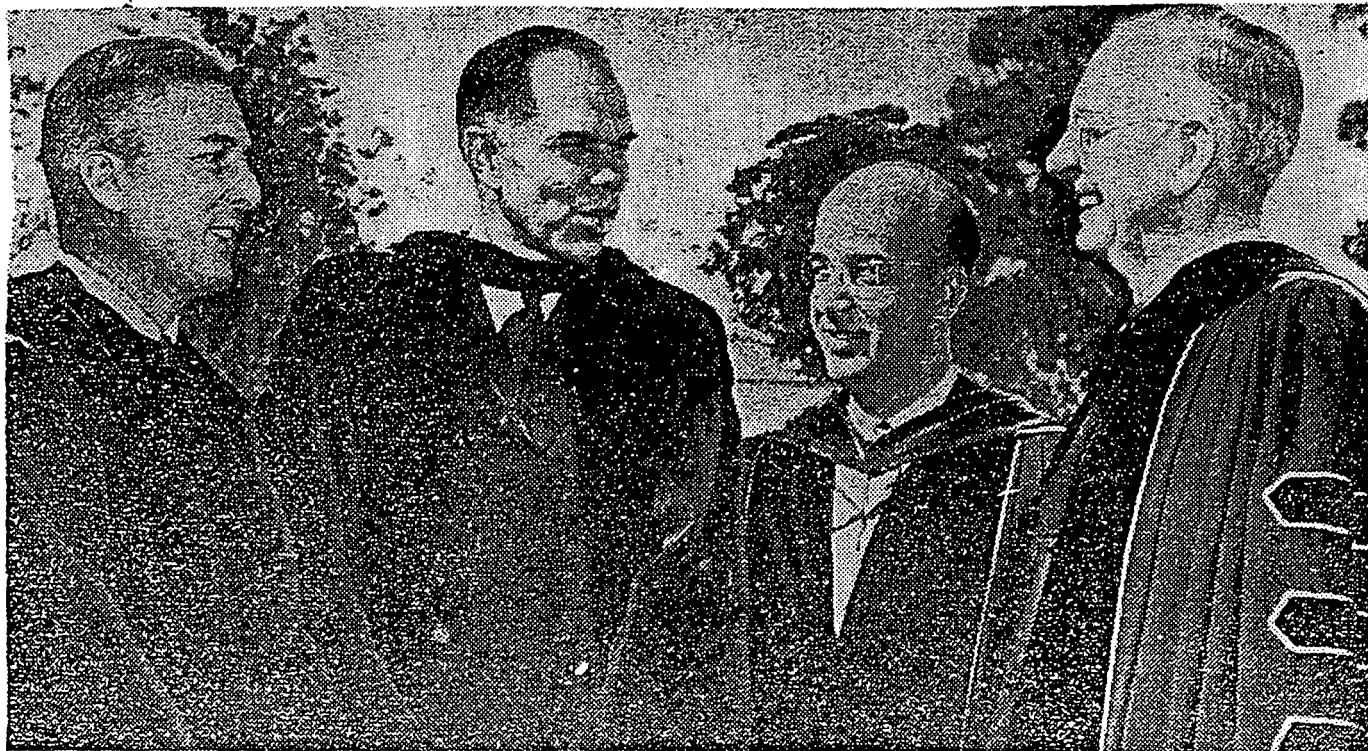
"The world has changed—from an emphasis on tradition to an emphasis on progress—and the universities have changed . . . to become the architects of progress instead of the protectors of traditions. In so changing, their roles in society has become ever more important."

"Of all the forces which have combined to cast the University in this role," Kerr continued, "the principal one—which also presents us with one of our greatest challenges for the future—is the unbelievable acceleration in the accumulation of knowledge. . . We know so much that no one can know very much; for as there is more to know each one of us grows relatively more ignorant."

"To create new knowledge, to train the men and women who can use this knowledge, to make this knowledge comprehensible and thus the servant rather than the master of men—these are the great tasks of the university. . . in an age of the most fabulous unfolding of the

human mind in history. This can be a truly golden age in the life of the University of California during which may yet become a golden age for mankind," Kerr concluded.

00710



NEW PRESIDENT—Attending the inauguration yesterday of Clark Kerr (right center) as President of the University of California are (left) Nathan Pusey, President of Harvard University (left center), Glenn T. Seaborg, new Berkeley Chancellor, and Robert Gordon Sproul, retiring UC president.

CLARK KERR INAUGURATED

By WILLIAM BOQUIST

The past and the future met briefly in the present yesterday as the University of California, in high academic rites, installed a new president.

On the marble stage of the classic Hearst Greek Theater in Berkeley, Clark Kerr, the 12th president in California's 90 year history, was formally inaugurated into office.

Noted Educators—

The ritual was attended by a rarely assembled delegation of the highest distinction.

From the far corners of the world they came, more than 400 representatives of colleges, universities and scholarly and educational societies.

Dressed fittingly in black academic robes, they came to pay tribute to one of the world's foremost universities

and to wish its youthful new leader a smooth course ahead.

Kerr, at 47 combining a firmly disciplined, yet gentle spirit, spoke soberly and at length on the worth of intellect in the current age.

"My own first thoughts at this ceremony are of the men who have preceded me," he said.

"Each of them was deeply dedicated to the university. Each must have been grateful and proud of the opportunity to contribute to its development. All of them faced exciting challenges."

From Henry Durant, California's first president, on through to Robert Gordon Sproul, who retired June 30, Kerr said, each man left a rich heritage.

PRAISES SPROUL.

During his own inaugural address 28 years ago Sproul had described the future as a "stern test," Kerr said.

"Yet as we view the University of California today, an academic community unsurpassed in size and seldom equaled on the more important scale of scholarly distinction, we can turn to him and say, with conviction and with gratitude:

"Robert Gordon Sproul, you have passed your stern test, summa cum laude."

But the university's present excellence, he said, rests as well on the sacrifices of thousands of faculty members, alumni, regents, students, legislators, private citizens and "the immeasurable benefits of an enlightened and friendly environment."

"Never before has the university so needed the support of its friends. If our expectations are to be fulfilled, we shall have to meet immense challenges."

The need to accommodate vastly increasing numbers of students is only a part of the university's role, he said.

There is a larger role, "more important in our century than ever before in the history of

civilization. The work to be done by men and women of trained intellect is greater and more desperately urgent today than at any previous time."

"Looking ahead," he continued, "it seems to me that at least four paramount tasks present themselves to the university in our society.

Dr. Kerr's Boyhood Teacher Guest at U.C. Inauguration

BERKELEY, Sept. 30—A 71-year-old retired school teacher from the tiny community of Stony Creek Mills, Pa., was the special guest of honor at the inauguration of University of California President Clark Kerr yesterday.

The visitor was Mrs. John L. Babb, who was Kerr's teacher from the first through the fifth grades and received a personal invitation from Kerr to attend the investiture ceremonies.

Mrs. Babb arrived in the Bay Area Sunday with Kerr's sister, Charlotte.

"I want to be known as Miss Elba. I think that's more homey," she told reporters.

Miss Elba described the building where she taught Dr. Kerr for four years as "a little red brick school house at the end of Spook Lane."

Dr. Kerr completed five years of schooling in four years, she reported. "He was a brilliant student. He never

wasted any time. When the rest of the children were having fun, he was always working."

In the lower grades, she said, Kerr would "watch, listen and absorb" what the older youngsters, were talking about and doing.

Miss Elba emphasized that he was not over-studious. Dr. Kerr was also a leader on the school grounds. "We had no supervised play. In fact, the children were undisciplined."

Oakland Tribune, Tuesday, Sept. 30, 1958



HIS FORMER TEACHER—U.C. President Clark Kerr chats with his former schoolteacher Mrs. John L. Babb of Stony Creek Mills, Pa., following Kerr's inauguration.



HONORARY DEGREES—Anson Stiles Blake (left), 88, and Walter A. Haas Jr., 69, both U.C. graduates, were among four persons to receive honorary degrees.

WASHINGTON ROLE

Each year, the youngsters would enact the American Revolution. "The children always insisted that Clark play George Washington," she recalled.

Kerr's best friend, she remembered, was always cast as Cornwallis and annually was forced to surrender to his pal.

Another incident still fresh in Miss Elba's memory is a time she opened her desk drawer and a mouse jumped out. "I screamed, jumped and refused to return to my desk until I was assured there weren't any more mice around."

For years, Mrs. Rabb remained mystified as to the identity of the culprit.

PRANK CONFESSED

"I found out 35 years later that Clark put it there. He called on me three years ago and asked about the mouse."

Mrs. Babb calls Kerr "my boy. I have trailed him all through his life. I always tell my friends that I have a boy out there in California."

From work in the small schoolroom outside of Reading, Pa., Miss Elba sensed that Clark Kerr was headed for greatness.

"He had vision and moral courage. He had the capacity for independent thinking that is needed in the world these days. Without free minds, we shall not remain free people."

Mrs. Babb dispelled popular campus rumor that she once told Kerr, "You'll never amount to anything unless your handwriting improves."

Miss Elba takes full blame for Kerr's "cramped" penmanship.

TAKES THE BLAME

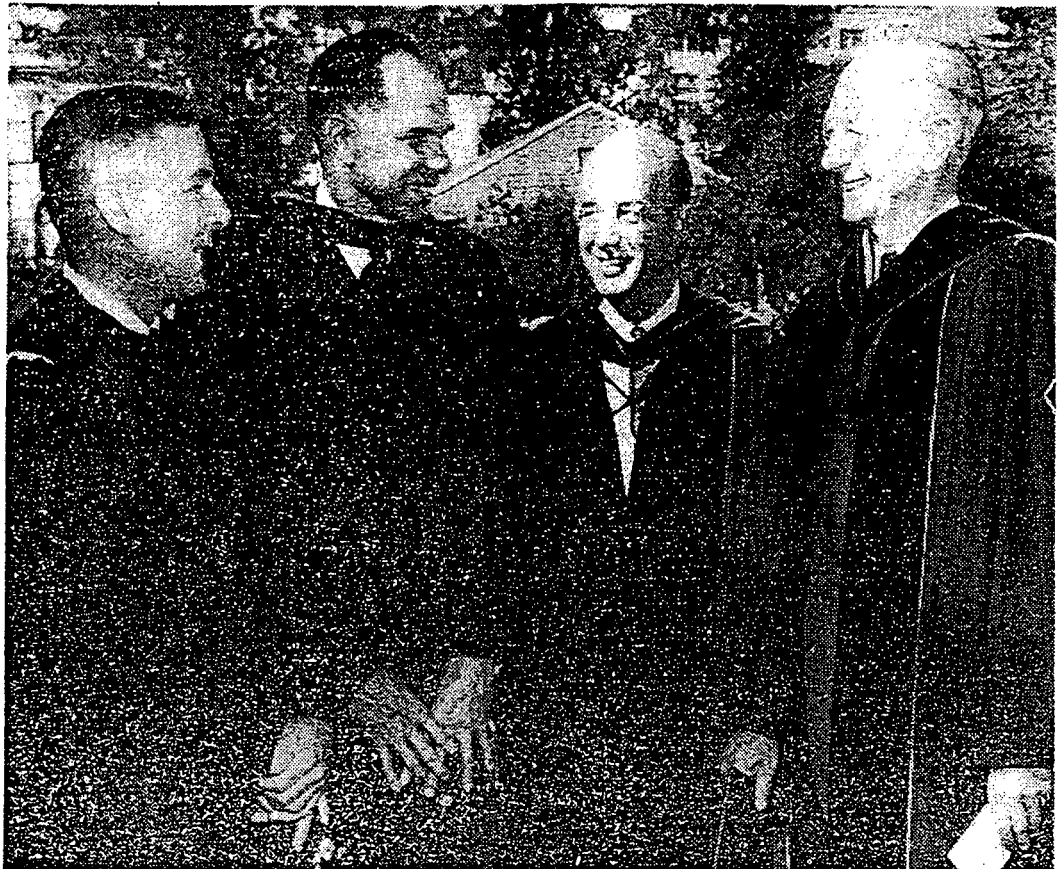
"That's where I failed," she said jokingly. "Some of our greatest men are poor writers. But it wasn't his fault. We used a method I don't really like. I believe every child should develop his own handwriting."

She made even members of the Kerr household agree that however cramped the president's penmanship it, it is still legible.

Miss Elba found that Kerr had listened so well to the fourth graders while he was in the third grade that he knew the entire fourth grade curriculum.

So she allowed young Clark to skip a grade and move straight into the fifth.

In a way, she was sorry she jumped him. Not because he didn't make the grade — but because she had Kerr as a student for only four years.



Tribune photos

ATTENDING INAUGURATION—Among those attending the inauguration of Dr. Clark Kerr (2nd from right) as the University of California's 12th president were (from left)

Nathan M. Pusey, Harvard president; Glen Seaborg, new U.C. chancellor, and Robert Gordon Sproul, U.C. president emeritus. The ceremony was held at Berkeley.



DOCTORS OF LAW—Mrs. Clara Hellman Heller (left) and Mrs. Lucy Sprague Mitchell received the honorary degree of doctor of laws yesterday at the U.C. rites.

Greek Theater Scene of UC Inaugural

"One is to continue to stimulate the quest for knowledge to future generations. Another is to transmit our knowledge to enable us to remain masters of our knowledge, to prevent the complete fragmentation of our view of ourselves, our society and our universe.

"The fourth, and perhaps most exacting, is to assess the values which our knowledge should enable us to serve.

"In a century which by creating much has overthrown so much, men of intellect everywhere have an obligation which they must not betray.

HUMANITIES ROLE.

"The philosophers and humanists of our universities bear a large share of that burden. More than anything else the tradition of the humanities is the cement which binds our civilization together.

"The future for which we are preparing need not be the result of blind fate. It can be ours to make.

"These are the tasks of the University of California in an age of the most fabulous unfolding of the human mind in history.

"This can be a truly Golden Age in the life of the University of California during what may yet become a Golden Age for mankind."

Preceding Kerr to the stage was Donald H. McLaughlin, chairman of the University of California Regents.

"Clark Kerr has the very special qualities of mind—and I must add also of body—needed to meet the rugged and exacting responsibilities imposed upon the

president of this vast institution.

"He fortunately is a man whom burdens appear to strengthen—and that being the case, I am sure we can count on renewed strength in generous measure for him each year."

Among the spectators at the afternoon ceremony were Mrs. Kerr and the three children, Kerr's sister, Charlotte, of Reading, Pa., and his grammar school teacher, Mrs. Elba Babb.

Presiding on stage was Kerr's successor as Berkeley Chancellor, Nobel Laureate Glenn T. Seaborg.

Greetings were presented from Governor Goodwin Knight, Stanford President J. Wallace Sterling, Alumni President Mortimer Smith, Student Body President William Strickland, and University Marshal Frank Kidner, representing the faculty.

Honorary doctor of laws degrees were bestowed by Kerr on four famed Californians.

They are Anson Blake, of the University YMCA; Walter A. Haas Sr., chairman of the board, Levi Strauss & Company; Clara Hellman Heller, and Lucy Sprague Mitchell, first dean of women at the university.

Preparations for yesterday's event had begun months ago, and the day included two notable "firsts": the new UC flag, flying on the staff at the Greek Theater, and newly designed academic robes for the regents.



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Tribune photo



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Seaborg Named Chancellor at Berkeley

ONE OF THE world's greatest scientists became Chancellor of the Berkeley campus of the University of California last month. Glenn T. Seaborg, who shared the 1951 Nobel Prize in Chemistry, succeeds Clark Kerr who became President of the University on July 1.

Seaborg's appointment was made during the July meeting of the Board of Regents. Currently serving as associate director of the University's Radiation Laboratory, Seaborg will continue to serve in that capacity as Chancellor.

The new Chancellor was born in Ishpeming, Michigan, was raised in Los Angeles and worked as a stevedore before he entered UCLA in 1929. He obtained his Ph.D. on the Berkeley campus in 1937. He was named Alumnus of the Year in 1943.

Since 1941 he has participated in the discovery of all the artificial elements from the atomic energy fuel, plutonium, (element 94) through the recently discovered element 102.

Seaborg is Faculty Athletic Representative for the Berkeley campus and has spoken and written extensively on the need for improving the educational programs of secondary schools.

On his selection to the Chancellorship, Seaborg said, "We have earned the respect of the people of California and of the academic world by traditionally attracting faculty and students of high caliber. As California citizens send more students to us and we inevitably increase in size, we must redouble our efforts not only to continue but to improve the University's high intellectual caliber. We must exercise care to have a proper balance between the humanities, the professional areas, the social sciences and the physical and natural sciences and we must never allow an overemphasis in any one of these areas of scholarship." ◀

Regents choose a Nobel Laureate to succeed Clark Kerr in guiding destiny of University of California's Berkeley campus

Erich Hartmann, Magnum



CHANCELLOR SEABORG at Radiation Lab where he will continue on as associate director.

Seaborg to Give Lecture

Berk. Gaz. 10/3/58
Chancellor Glenn T. Seaborg, of the Berkeley campus of the University of California, will depart tonight for the East to attend three meetings and deliver a lecture.

He will deliver the William D. Harkins Memorial Lecture at the University of Chicago next Thursday evening. The late Dr. Harkins was a pioneering nuclear chemist at Chicago. Chancellor Seaborg will speak about future transuranium elements.

Tomorrow and Monday he will attend a meeting in Washington, DC, of Century 21 Exposition's National Science Planning Board, of which he is a member. The Century 21 Exposition will be a world science exposition in Seattle, Wash.

On Tuesday and Wednesday he will attend a meeting of the visiting committee on chemistry at the Oak Ridge National Laboratory. He is a member of the committee, which is advisory to the laboratory's chemistry program.

On Thursday and Friday he will attend, with Vice-Chancellor James D. Hart, a meeting of the American Council on Education in Chicago.

U.C. Chancellor Seaborg Off on Eastern Tour

BERKELEY, Oct. 4—Chancellor Glenn T. Seaborg of the University of California's Berkeley campus today began an eastern trip to attend three meetings and deliver a lecture.

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Thursday evening. The chancellor will talk about future transuranium elements. Dr. Harkins was a pioneer nuclear chemist.

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to Oak Ridge, Tenn., Tuesday for a two-day meeting of the Oak Ridge National Laboratory's visiting committee on chemistry.

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October 5, 1958

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SETTLEMENT SEEN ON ATOMIC PATENT

Libby Expects Board to Act on Plea by 4 Scientists Within 'a Few Months'

By PETER KIHSS

A claim for royalties on a basic method of extracting nuclear fuel should be settled "in a matter of a few months," Dr. Willard F. Libby of the United States Atomic Energy Commission said yesterday.

The claim involves the initial concept for the gaseous diffusion process for separating uranium 235 from the heavier uranium 238 with which it is associated in nature. U-235, which accounts for only 0.7 per cent of natural uranium, was the fuel for the first atomic bomb.

No specific sum is claimed, but it is understood the application may involve tens of millions of dollars based on a percentage of the value of U-235 produced thus far.

Such production might be estimated at anywhere from \$1,000,000,000 to \$20,000,000,000, depending on the method of calculation.

On the other hand, the commission has made only two substantial awards under the Atomic Energy Act of 1946 providing for reasonable royalty fees, just compensation and awards in special cases.

A \$300,000 award went to Dr. Enrico Fermi and six associates for work in Italy before 1934 involving production of radioactive materials. Initially they had asked \$10,000,000.

The other award was for



The New York Times
Dr. Willard F. Libby

\$400,000 on a claim by Dr. Glenn T. Seaborg and three colleagues covering basic processes for separating plutonium, the nuclear fuel in the second atomic bomb used against Japan.

The U-235 claim has been advanced before the commission's Patent Compensation Board by the Basic Science Foundation for more than a year.

Dr. Robert L. Johnson, president of Temple University in Philadelphia, said the foundation had been specially set up by the four scientists involved to distribute as grants for basic research by leading universities any funds awarded beyond "a small amount the inventors would get."

The four scientists are Dr.

John R. Dunning, Dean of the School of Engineering at Columbia University; Dr. Eugene T. Booth, Professor of Physics now on leave from Columbia and living in Washington; Dr. Alfred O. C. Nier, Dean of the School of Engineering at the University of Minnesota; and Dr. Aristid V. Grosse, president of the Research Institute of Temple University in Philadelphia.

Dr. Johnson, reluctant to discuss the case, said the scientists had set up the foundation two or three years ago so that the bulk of their compensation could be "used for basic research in the best interests of the United States."

He said he was named president as a layman to pick other members of the board. Dr. George B. Pegram, former Columbia vice president, who died last Aug. 12, was named board chairman.

20 or 30 Grants Planned

The intention, Dr. Johnson said, would be to give the major grant to Columbia, followed by Minnesota and Temple and then twenty or thirty other leading universities with scientific laboratories.

The scientists first applied for a patent in 1940. This was after Dr. Nier had provided tiny amounts of different forms of uranium concentrated by his mass spectrometer, for work by Dr. Dunning, Dr. Booth and Dr. Grosse with Columbia's cyclotron. They showed that U-235 could be split by slow neutrons to give atomic energy.

The official United States report on the atomic bomb, written by Dr. Henry DeWolf Smyth of Princeton, said "the diffusion method was apparently first seriously reviewed by Dunning in a memorandum to G. B. Pegram" in the fall of 1940. This summarized the Columbia investigations.



OAKLAND, CALIFORNIA, WI

Kerr Lifts U.C. Rule Banning Political Talks

1958

BERKELEY, Oct. 8 — University of California President Clark Kerr today suspended a regulation which prohibits student groups from inviting candidates for state office to make political speeches on campus.

The rule applied to those candidates for state office who, upon election, would be in a position to review or approve the university budget.

However, Chancellor Glenn T. Seaborg said that permission for political talks normally will be granted only when opposing candidates can speak from the same platform or when they can speak separately under similar circumstances.

Seaborg said the suspension will remain in effect during a test period which ends Jan. 1 and that it may be eliminated completely if present studies indicate it no longer serves a good purpose.

The regulation originally was set up to forestall embarrassment to the university and to opponents of candidates who might be favored by partisan student groups, Seaborg explained.

UC Lifts Campus Ban On Politics

S.F. Chronicle 12/10/58

The ban on campus speaking engagements at the University of California in Berkeley for candidates seeking State office was suspended on a test basis yesterday by President Clark Kerr.

Chancellor Glenn T. Seaborg announced that student groups are now free to invite political candidates to appear before them—if appearances by rival candidates are also arranged.

Under the old ban, all candidates for State office who would, upon election, review or pass on the University budget in any way, were not permitted to speak before a student group on campus.

This forestalled political embarrassment for the university, but, as Seaborg said yesterday, also limits the rights of free speech and the right of students to hear candidates.

SAN FRANCISCO CHRONICLE
Sporting Green
Sunday, October 19, 1958

Troy Hurt By Penalty, Mis-calls

By Paul Zimmerman

LOS ANGELES, Oct. 18—
One of the happiest men in the victorious California dressing room today was Chancellor Glenn Seaborg as he proudly display a Trojan necktie.

"Dr. Norman Topping (Southern California's president) and I agreed before the game that the loser would present the other his tie and go to the reception tonight without one," said the famed scientist with a big grin, "and here it is."

So, any way you look at the 14-12 outcome it was no tie for SC.

Coach Pete Elliott spoke quietly of the victory.

"I'm sure the heat affected both teams a great deal out there today," said Pete, "and we were fortunate in getting that early 14 to 0 lead.

"I know our boys were awful tired when we went out on the field for the second half and I'm sure the Trojans were too.

"In the second half the kicking was the most important factor. Certainly those fine kicks by Wayte Crow and Joe Kapp made Southern California's task more difficult."

One of Crow's kicks went 64 yards, out of bounds on the Trojan 22. Tro drove back and lost the ball on an interception on the California one. The next one sailed 49 yards, with SC eventually scoring after this one.

Except for Michigan State, Elliott thought the Trojan team "rates high with the teams we've played this fall. SC is strong physically and I thought coach Don Clark did a good job with his boys.

Meanwhile the USC coaches felt that a wrong-way shift on a conversion play and costly fumbles contributed as much as any one thing to the Trojans defeat.

The shiftless shift occurred after SC had scored its second touchdown to pull within two points of the Bears at 12-14. SC moved into a T and then shifted into a place kick formation and in so doing went over the allotted 25 seconds to put the ball in play and drew a five-yard delaying the game penalty.

Quarterback Al Prukop's ensuing pass from the eight-yard line was picked off by Kapp and the Bears had their margin of victory.

Trojan head Coach Clark said he had sent in instructions to shift from a place kick formation into a T but in the excitement USC did just the opposite.

Sophomore Prukop said:

"Somebody came in and said something to me before the conversion. But in the excitement I didn't hear him."

Prukop, who played surprisingly well despite his inexperience, then added in a frustrated tone, "we beat ourselves."

Clark was asked to comment on the 15-yard piling on penalty assessed the Trojans which set up Cal's first score. Clark Holden had thrown Kapp for a 6-yard loss setting up a second and 16 to go for a touchdown situation when guard Mike McKeever was singled out for piling on. That infraction moved the ball to the one where Cal scored easily.

"Let's say that ruling was very fortunate for California," said Don a little testily. "Those 15 yards are the hardest 15 to make on the field and Cal had the distance handed to them."

Clark conceded that this penalty was probably the deciding factor of the game.

Contract Let for Four-Story Addition to U.C. Stern Hall

Oak. Trib. 10/22/58

BERKELEY, Oct. 22 — The University of California has awarded a contract for the construction of a four-story addition to Stern Hall, first women's on-campus residence unit at U.C.

Chancellor Glenn T. Seaborg reported that a \$211,880 contract has been given to the Oakland firm of McBroom and Cecchini.

The new construction will add 23 double bedrooms and enlarged dining facilities to Stern Hall, situated at Hearst Ave. and Gayley Road. The expansion will increase the number of residents from 90 to 136.

The new wing, scheduled to be ready for occupancy in a year, will be built from uni-

versity funds plus a \$50,000 gift from Walter A. Haas of San Francisco, chairman of the board of Levi Strauss and Co.

Mrs. Haas, the former Elise Stern, is the daughter of the late Mrs. Sigmund Stern, San Francisco philanthropist who provided the funds for the original residence hall.

William W. Wurster, dean of the U.C. College of Architecture, designed both the original hall and the addition.

10/23/58

TV Beneficial, Says Seaborg

By combining the advantages of television with increased leisure time "we may catch up with the demands of our age," Nobel Prize winner Glenn Seaborg said today.

Seaborg, University of California chancellor, said through TV "more than 90 per cent of American homes can become centers for the continuance of intellectual development."

In an address prepared for a luncheon of business leaders at San Francisco educational TV station KQED, Seaborg said television has not been used as widely as it should. Television, he said, can educate more people with less teachers. He added that TV instruction has been proved as effective as conventional methods. *See K. Gazette*

Wave of the Future

The future is galloping toward us at a great rate, bringing with it challenges mankind now is not prepared to meet. It is later than we think—but not too late.

An awesome array of evidence to prove the case was presented last week by UC's famed chemist, Dr. Glenn Seaborg. He defined the heart of the matter in one word: Population.

Every 40 years there are twice as many people on earth as there were before. If you think the Bay Area has changed within your memory, with population tentacles spreading into the suburbs and beyond into the farms, think how it will look 40 years from now through the eyes of a baby born today.

UC's Dr. Edward Teller has predicted, and not without seriousness, that within 200 or 300 years we may HAVE to colonize another planet.

As the number of people increases, resources to support them dwindle. We are short of water, drilling deeper for oil, processing lower grade minerals and using up arable land with homes, factories and highways.

New sources of power and new ways to provide food give world science its most compelling area for



research. There are sociological implications, too. How can we learn to live together in an over-crowded world? When there are too many people in a room, some have to stand.

If you think you have used up most of your allotted span and all this means nothing to you, be sure that it means everything to your children. They will be in the middle of it.

UC experts are researching into the future. We wish them the very best. It would be better for man to solve his problems on earth than go to Venus as Dr. Teller suggested.

'University Night' Speaker for Monday Is Glenn T. Seaborg

Glenn T. Seaborg, chancellor of the Berkeley campus, University of California, will be the featured speaker at the sixth "University Night" program to be held on Monday at 8 p.m. in the main lounge of the California Alumni House on campus.

Chancellor Seaborg will discuss "The Second Geneva Atoms-for-Peace Conference." In addition to his duties as chancellor, Dr. Seaborg is a professor of chemistry and associate director of the Radiation Laboratory. One of the world's most eminent scientists in his field, he has received numerous honors for his work, the most notable being the Nobel Prize in chemistry which he received in 1951 with E. M. McMillan, now director of the Radiation Laboratory.

Another feature of the meeting will be the showing of films of today's California-Oregon football game.

The series is sponsored by the California Alumni Assn. and continues throughout the football season. There is no charge for admission and all California alumni, faculty members and friends of the University are invited to attend. *Berk. Gazette 10/25/58*

UC Faculty Lectureship For Seaborg

Chancellor Glenn T. Seaborg, Nobel Laureate in chemistry, has been named faculty research lecturer for the Berkeley campus of the University of California for the academic year 1958-59.

Selection of Chancellor Seaborg was made by a faculty committee headed by Dr. M. B. Emeneau, professor of general linguistics and Sanskrit, and which included some of the campus' most distinguished scientists.

The faculty research lectureship is bestowed annually upon an individual whose researches have outstanding merit. The lecture will be given next Spring, during the annual Character Week observances.

Chancellor Seaborg's selection is a recognition of his stated intention to continue to spend part of his time doing scientific research. He assumed the chancellorship last August. The selection of a head of the campus to deliver the scholarly lecture is novel.

In giving reasons for Chancellor Seaborg's selection, the committee cited the discovery by the scientist and his co-workers of the transuranium elements beginning with element 94 (plutonium) and extending through elements 102; his discovery of scores of isotopes of stable elements; his leadership in pioneering the methodology and instrumentation of nuclear chemistry, and his influence in the training of most of the Nation's nuclear chemists.

Chancellor Seaborg received his AB at the Los Angeles campus of the University and Ph.D. in 1937, on the Berkeley campus. He has been on the Berkeley staff since his graduation, and he has been widely honored for his epochal researches, including the Nobel Prize in Chemistry in 1951.

Seaborg Book

Comprehensive Explanation

"Elements of the Universe" by Glenn T. Seaborg and Evans G. Valens; E. P. Dutton and Co., New York; 253 pages; \$3.95.

Few people in America today, as much as they might want to, can avoid realizing that we are in the midst of a scientific revolution of massive proportions. This is especially true on this campus, where even the most iron-bound English major is besieged with news of the discoveries made by members of our own faculty.

It is doubtful, however, whether very many of these non-scientifically educated laymen, this writer among them, really grasp the significance and the nature of what is happening to the worlds of physics and chemistry right under our own noses.

It is for this reason that we welcome with enthusiasm the publication of this book, co-authored by Chancellor Seaborg, whose work in the discovery of the synthetic elements has won him a Nobel prize.

Although described on the dust jacket as being designed for "keen young readers" it well withstands the scrutiny of older and not so "keen" readers.

"Elements of the Universe" was taken from the highly successful television series presented on station KQED, featuring Seaborg and other University scientists. As such it depends to a large extent on visual materials, photographs and diagrams, to present the basic facts about chemical elements and the recent research which has been done on them at the University and elsewhere.

In addition to Seaborg's work, the book also contains chapters by other noted scientists in the field. These include Melvin Calvin, famed for his work in the study of photosynthesis, Edwin M. McMillan, director of the Radiation Laboratory and others.

This is one of the most enjoyable features of the book—the opportunity to read explanations of their own work by some of the nation's leading scientists.

Another unusual aspect of the book is the appendix which gives among other information a concise and complete explanation of the periodic table and the naming of the elements. This is a subject which is often confusing to the layman and, as a matter of fact, for the uninitiated a reading of the appendices previous to beginning the book itself might well be helpful.

It is unfortunate that the volume does not also include a similar explanation of chemical symbols and the manner of representing chemical reactions. Although the text gives a fairly comprehensive explanation of the formulae and charts in the book, at first glance they present a formidable looking array of figures to the reader.

All this book takes is courage. At first glance, from the size of the print and the frequency of pictures, it may look deceptively simple. At second glance the figures made it look unrealistically difficult. It is neither. A careful reading of it should prove to be not only informative but even enjoyable. Even those who avoid science like the plague will find this book of value.

—Dan Silver

Faculty Research Lecture

Daily Cal.

10/28/58

Seaborg to Give Talk

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A close-up of Chancellor Glenn T. Seaborg
who was picked by the Regents to be . . .

Ted Streshinsky



CHANCELLOR SEABORG explains his views on the challenges of his new job.

Big Man

on the Berkeley Campus

ON THE afternoon of July 18, unfamiliar cars were parked in the spaces near Sproul Hall on the Berkeley campus. Top University officials, phone callers were informed, were "at a meeting." The signs were clear. The Regents were in monthly session.

That same afternoon, Professor Glenn T. Seaborg was at work in the Radiation Laboratory up on the hill when his phone rang. It was an assistant to President Clark Kerr with a message summed up in this greeting: "Hello, Chancellor Seaborg!"

From that moment on, the man internationally known as a discoverer of transuranium elements, and who shared the 1951 Nobel Prize in chemistry, was embarked on a new course in his distinguished career.

It cannot honestly be said that the appointment was a complete surprise. It was well known on the Berkeley campus that the tall (well over six feet), 46-year-old nuclear scientist was being considered as Clark Kerr's successor as Chancellor. There was some doubt, however, that the Regents would ask him to give up his scientific work to become a University administrator.

The doubts were founded upon a dilemma that neither the new Chancellor nor the Regents found to exist. The announcements of Chancellor Seaborg's appointment stated specifically that he would continue to serve as Associate Director of the University of California's Radiation Laboratory at Berkeley.

Anyone who thought that a man so thoroughly identified

with nuclear science could find nothing to interest him in the challenges University administration might offer, just hadn't been listening to Chancellor Seaborg in recent years. Before teachers' organizations, service clubs and other groups, he has taken the platform time and again to speak his convictions on American education—a topic of genuine concern to him.

At one gathering he itemized the waste of money and effort when "society is deprived of the new ideas the undeveloped intellect fails to produce." At another meeting he warned of the consequences of underexposing precollege students to fundamental education in sciences. At a third he championed better salaries for teachers, noting that "money for education is just sensible insurance in a world filled with unknown risks." At a college commencement last June, he criticized education narrowly conceived to provide job security. He argued that "training in the minutiae for some occupation of today provides neither practicality nor security in the long run. Such an education is education with built-in obsolescence."

The new Chancellor's interest in education is nothing lately formed. It can be traced, in part, to his great respect for one of his own teachers, Dwight Logan Reid, at David Starr Jordan High School in Los Angeles. Reid fired Seaborg's interest in chemistry and physics and inspired him to scholarly achievement recognized when he was named valedictorian of his class. This interest in education is probably influenced, too, by the fact that Chancellor

Seaborg is himself the father of five children, Peter, 12; Lynne, 11; David, 9; Stephen, 7, and John Eric, 4.

In an interview given just five days after he became Chancellor, Seaborg said: "There is a general feeling that 'all is not well' in education—particularly precollege education. Society needs more trained brainpower. As the proportion of trained people to unskilled people goes up, higher standards of education for everyone are required if people are to get along. Traditionally, a University is able to exert leadership, one way or another, in the whole educational future of our society. I consider it a tremendous challenge to do what I can in making a contribution to this effort."

THAT HE is aware of some of the major problems of his new job was indicated in a statement to the press at the time of his appointment. He said, "To continue the University's tradition of bigness and high quality in the years of rapid growth that lie ahead will test our imagination and our skill. There are difficult problems in faculty staffing, in the construction of physical plant and the maintenance of the vitally important but less tangible relationship between faculty and students which inspires the best performance of both."

In that same statement, he called attention to the tremendous growth of the University under the leadership of Presidents Robert Gordon Sproul and Clark Kerr. Later, in an interview, he said "What was it Churchill said? 'I have not become the King's first minister in order to preside over the liquidation of the British empire . . .' I feel somewhat the same way about the Berkeley campus. I hope to see the eminence of the Berkeley campus only increase. In recent years our University has consistently ranked among the top three in the country. I would hope that during my administration, the University's over-all distinction will be unexcelled. And that will take a little doing!"

THREE THINGS should make the doing a littler easier, however. One of them is the carefully worked out long-range physical development plan for the Berkeley campus. This plan (reviewed in some detail in this issue of CALIFORNIA MONTHLY), was completed under Chancellor Kerr and serves as a guide for all construction and space utilization at Berkeley. The second is an "Academic Plan" which was devised more or less simultaneously with the physical development plan but was made a matter of policy by the Regents at the same July 18 meeting that produced Seaborg's appointment. The third factor was the announcement in August of the appointment of two new vice-chancellors.

The academic plan suggests some important policies under which the new Chancellor will operate. Basically, the policy reaffirms that the Berkeley campus (the same policy holds for UCLA), will be comprehensive in nature with programs which have research, instruction, profes-

sional training and expert public service as controlling purposes.

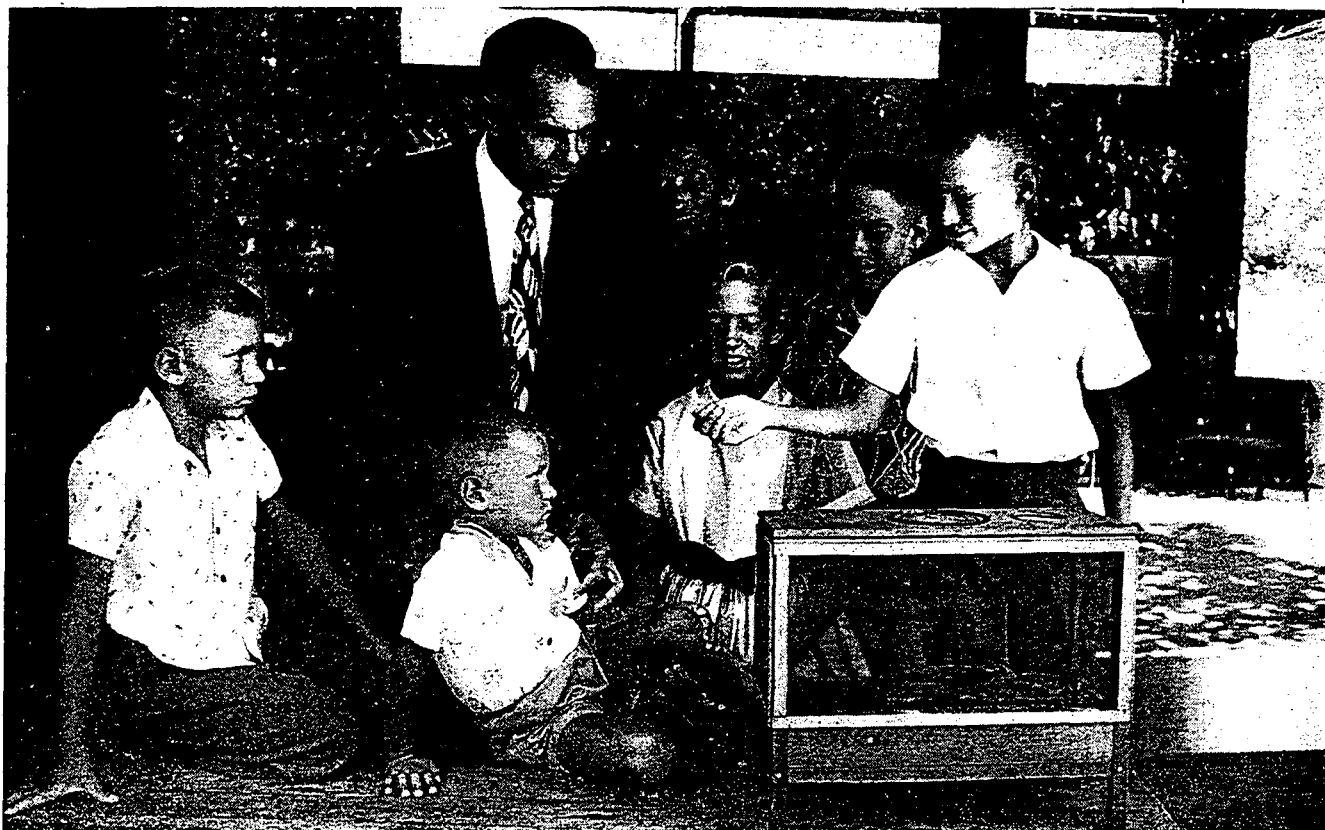
The keynote of the plan is the setting of standards for excellence in both research and instruction, and the facilities and environment that make them possible. This policy, highly generalized here (full text of the Regents' Policy Statement appears on page 4), places the Regents and the President directly behind the Chancellor in his work toward University eminence.

THE NEED for the policy statement itself arose from the terrific demands that will be made on the Berkeley campus because of California's rapid population growth. Chancellor Seaborg has had this problem well in mind. He feels that it would be preferable if the Berkeley campus could reach a student enrollment of about 25,000 (which it will by 1963), and stay there. But he feels if holding that line would mean keeping qualified young people out of the University, or putting the Berkeley campus "in some kind of a super-slot unattainable by large numbers," that steps should be taken to meet the challenge of even larger enrollments. "Whatever we do," he said, "I hope that it would mean that qualified people would have the same opportunities I had in studying at the University."

ACTUALLY, Chancellor Seaborg does not see size, in itself, a threat to quality education: "We must remember," he said recently, "that bigness has some advantages as well as liabilities. A large university with a great faculty can offer students a richness and breadth of intellectual opportunity, as well as great libraries and research facilities that cannot be duplicated in a small institution. Our challenge is to continue to put such assets to work for the greater good of students, faculty, and the people of California."

It is reasonable to assume that, in continually striving for excellence under conditions of growing enrollments, campus life will become more intense. "I have the impression our campus, whatever the causes, is already more intense," Chancellor Seaborg says. "Twenty years ago, summers were free; professors would spend the full summer at places like Lake Tahoe. Now there seems to be something to occupy them the year around here on campus. I would hope that the academic life could become a little more intense for our students, too. In precollege years, it definitely should be more intense. You know, up to a year ago, we were pretty worried here at Berkeley about the great degree of apathy, disinterest in elections and the cultural opportunities of the University on the part of the students. Last year, however, this whole idea of 'the New Spirit' emerged, and the tide began to turn. A lot of progress has been made and we think that even more will be made in the future."

Much of the responsibility for the University's relationship to its students at Berkeley will reside with Alex Sherriffs, who will serve as Berkeley's first vice-chancellor for student affairs. An associate professor of psychology,



Ted Streshinsky

AT THEIR HOME in Lafayette, the Seaborgs are shown a tiny lizard by David, 9. Other members of the family, left to right, are Stephen, 7;

John Eric, 4; Chancellor Seaborg, Mrs. Seaborg, Lynne, 11, and Peter, 13. Mrs. Seaborg is the former secretary to the late E. O. Lawrence.

Sherriffs was an assistant in matters of student relations under Chancellor Kerr.

In academic and administrative matters, Chancellor Seaborg will have the services of Vice-Chancellor James D. Hart, professor of English, and another new vice-chancellor, Edward Strong, a professor of philosophy who was also a former assistant to Chancellor Kerr. The appointment of the new vice-chancellors should provide added administrative strength to the Berkeley campus. Their presence, though not intended for that purpose (the position of vice-chancellor for student affairs was created in a study made long before Seaborg's appointment), should improve the Chancellor's chances of success in following his scientific interests.

"Of course, I'll be on reduced schedule at the Radiation Laboratory, and will have fewer jobs to do up there," he told your editors. "My job as Chancellor will have to be my number one responsibility." He indicates, however, that he hopes to continue some of his research and to teach a few graduate students.

EVEN IF he wanted to, it is doubtful that he could ever completely withdraw from the obligations his eminence as a scientist places upon him. Before he was named Chancellor, he accepted an invitation to give one of the keynote addresses at the second "Atoms for Peace" conference in Geneva. This conference took him away from the campus for nearly two weeks beginning September 1. It is likely

that similar invitations will come in the future.

The fact that the Regents selected a distinguished scientist as Berkeley's second chancellor would suggest to some people that more emphasis on the role of sciences in the University's curriculum should be expected. Chancellor Seaborg was quick to recognize this fact, and, in his statement to the press on July 18, assured: "We must exercise care to have a proper balance between the humanities, the professional areas, the social sciences, and the physical and natural sciences, and we must never allow an over-emphasis in any one of these areas of scholarship."

The idea of a scientist heading a University while continuing to be active in science is relatively unique in this country. Many scientists have become college presidents, to be sure, but most of them have given up science to do so. In Europe, however, there are many examples of eminent scientists, including Nobel Prize winners, who became or are heads of universities.

The prospect of hard work that such responsibilities will undoubtedly require leaves the Chancellor unperturbed. "I've always worked long days, and there are week ends and evenings when one can get time for research."

Chancellor Seaborg's capacity for work was evident in early childhood. He earned his own spending money by taking paper routes and mowing lawns. On graduating from high school, he worked for three weeks as a stevedore at a warehouse. Later, he worked as a night laboratory assistant at Firestone Tire and Rubber Company to earn

money for his freshman year at the University. During his first summer vacation, he picked apricots in the San Joaquin Valley, and became an apprentice to a linotype machinist for a Los Angeles newspaper.

By 1931, he was working in the chemistry laboratories at UCLA where he prepared samples, did research, read problem sets and examinations, and eventually even did some teaching.

Chancellor Seaborg received his A.B. degree from UCLA in 1934 and his Ph.D. at Berkeley in 1937. (He is the only person to have been named "Alumnus of the Year" by alumni of both campuses of the University.) After he received his Ph.D., Chancellor Seaborg spent two years as a laboratory assistant to the late Gilbert N. Lewis, then Dean of the College of Chemistry at Berkeley.

IN 1939, he became an instructor at the University and was promoted to assistant professor in 1941. During this period he and his associates discovered several dozen isotopes and published some 40 scientific papers. In 1940, the group crowned their earlier efforts with the discovery of the new synthetic element—plutonium (element 94). An isotope of this new element proved to be fissionable and thus suggested its potential as a source of atomic power.

It was decided that plutonium research of the Manhattan Project should be undertaken at the University of Chicago Metallurgical Laboratory, and Seaborg secured a leave of absence from the University and went to Chicago in April, 1942.

Before leaving Berkeley, Chancellor Seaborg became engaged to Helen L. Griggs, then secretary to the late Ernest O. Lawrence, Director of the Radiation Laboratory at Berkeley. On a rushed business trip to Berkeley a few months later he took a day off and they were married on June 6, 1942, in Pioche, Nevada.

Until May, 1946, Seaborg served as chief of the section at Chicago that was working on transuranium elements. The Plutonium team soon expanded to over 100 scientists.

Under Seaborg's leadership, the team had the responsibility to work out the complete chemical process for separating plutonium, produced in the chain reacting piles, from the mixture of uranium and intensely radioactive fission products at Oak Ridge, Tennessee, and Hanford, Washington. The imagination and daring of the group in developing techniques for working with extremely minute quantities of materials, resulted in finding the process required in a little over a year. Many responsible scientists predicted that five years would be needed for the task.

While in Chicago, Seaborg and his associates also discovered two more transuranium elements: americium (element 95) and curium (96).

Chancellor Seaborg returned to the chemistry department at Berkeley in 1946 as a full professor (skipping the rank of associate professor), and took responsibility for directing nuclear chemical research at the Radiation Laboratory. During the postwar years, Dr. Seaborg and his colleagues discovered berkelium (element 97) and cali-

fornium (98). Since 1952, they have discovered einsteinium (99), fermium (100) (with the scientists of Argonne National Laboratory and Los Alamos Scientific Laboratory), mendelevium (101) and element 102.

Alumni of the Berkeley campus have come to know the new Chancellor through his past participation on the President's and Chancellor's tours to visit alumni clubs throughout the state, his lectures at alumni institutes, and his visits to the Lair of the Bear summer camp.

Through these associations, Chancellor Seaborg has developed a high regard for alumni efforts. "I certainly appreciate all that alumni have done for the University in the past," he told us, "and I look forward to their continuing support in the future." He is aware that alumni will always have opportunities to help the University in important ways. An obvious example is the support alumni are currently giving to the Student Center campaign. For the immediate future, he expressed the hope that alumni would inform themselves concerning the implications of such November ballot measures as Proposition 3, the passage of which would insure progress on the University's building program; and Proposition 17, which the Regents have gone on record as opposing on the grounds that it would impair California's ability to meet essential requirements of the State, including higher education. "As our population grows and the demands upon higher education become more pressing, our alumni will have increasing responsibilities for remaining aware of the implications of all public policy affecting the excellence of their University," the Chancellor said.

ONE INTEREST the new Chancellor specifically shares with many alumni is athletics. Golf is his chief hobby, and he shoots in the nineties. His favorite spectator sport is football. From 1953 until two weeks after he became chancellor, he served as Berkeley's Faculty Athletic Representative. In this capacity he worked closely with the then Chancellor Clark Kerr, and the athletic staff of the ASUC during the turbulent period that saw the disintegration of the Pacific Coast Conference and the formation of the new Athletic Association of Western Universities.

Chancellor Seaborg reads a great deal, devoting much time to scientific literature. He also likes biographies. He follows politics closely and is well-informed on world affairs.

Since July, 1951, his spare-time interests have been devoted primarily to his duties as a homeowner. Chancellor Seaborg and his family live in Lafayette, 11 miles east of the campus. They developed the general design of their modern redwood home themselves. Before his appointment, it was believed that the new Chancellor would reside at the President's Home on the campus, but the Seaborgs decided against the move and the President's Home is now being used as a reception center for distinguished University guests. Quarters in the historic home will be available for the Chancellor, however, when his work keeps him on the campus until late at night. ◀

THINK

OCTOBER 1958

"I haven't cornered the man-made elements market. The first . . . was discovered in Italy in 1937, . . . others which filled out the old 92-element Periodic Table were found soon afterwards."



a visit with GLENN SEABORG

By LEE EDSON

A Nobel laureate, in a conversation with THINK's reporter, discusses the elements he discovered, and the lighter side of their names.

DR. GLENN SEABORG, the new chancellor of the University of California at Berkeley and one of the world's leading nuclear scientists, was once asked what he did for a living. He is said to have replied laconically: "I discover elements."

Dr. Seaborg has devoted almost half of his 46 years to finding new building blocks of the universe and extending our knowledge of them into domains never reached before. He and his colleagues have discovered nine synthetic elements heavier than uranium, the heaviest natural element. One of these elements—plutonium—brought him a Nobel Prize in 1951, a small fortune in patent rights, and a permanent place in history as one of the architects of the A-Bomb. Recently, the University of California's famed Radiation Laboratory unveiled its newest discovery, Element 102, and Dr. Seaborg, still associate director of the Lab, believes that Elements 103 and 104 may not be far behind.

Curious about what all this means to us and what a modern Prometheus is like, I visited Dr. Seaborg in his office, which he'd just inherited from Clark Kerr, former chancellor and now president of the university. Michigan-born Dr. Seaborg, the offspring of three generations of hard-working Swedish machinists, proved to be a lanky 6-foot-two-and-a-half with dark thin-

ning hair, rugged Carl Sandburgian features, and a quiet almost shy manner. As we shook hands, he motioned me to a couch in the corner of his office.

"Since you've virtually cornered the market on man-made elements," I began, once we were seated comfortably, "I'd like to know whether these new elements have any practical significance."

Dr. Seaborg smiled. "First, I haven't cornered the man-made elements market," he said. "The first synthetic element, No. 43, was discovered in Italy in 1937, and three others which filled out the old 92-element Periodic Table were found soon afterwards. But to answer your question, plutonium is of course the most important of the trans-uranium elements because one of its isotopes is a source of nuclear power. As for the other elements, they all reveal new information about nuclear and atomic structure, which is of importance in discovering how to utilize atomic energy."

"How did you get involved in the discovery of these elements?"

"It started simply enough. In my senior year at UCLA I learned about the invention of the cyclotron at Berkeley, and I became so fascinated I determined to take my Ph.D. there. In those pioneer days I did most of my work with radioactive isotopes. Then in 1940, two

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of my colleagues, McMillan and Abelson, discovered Element 93, which they named neptunium after the planet just outside Uranus. Shortly afterwards, we found Element 94, plutonium. At first, we gave it the code name of 'copper.' Then when we had to introduce real copper into our experiments, we distinguished it from the other copper by calling the latter 'Honest-To-God Copper.' This nomenclature became troublesome, so in 1942 we went back to the old-fashioned system of naming elements after the planets and we named our discovery after the last planet, Pluto."

Dr. Seaborg paused and asked whether I'd like to hear about the other elements, and how they were named. When I said yes, he continued.

"The next two elements, 95 and 96, which we found at the University of Chicago, were hard to analyze chemically, so at first we referred to them as 'pandemonium' and 'delirium.' When we finally managed to identify them, we found we had run out of planets so we named Element 95 'americium' after America because it was analogous to 'europium,' which was named after Europe. Element 96 was christened 'curium' after Pierre and Marie Curie because it was analogous to 'gadolinium,' a rare earth which bears the name of another famed investigator, Johannes Gadolin. Similarly, Element 97, which we found at the University of California after World War II, was named 'berkelium' after the city of Berkeley because it was analogous to 'terbium,' Element 65, which was named after Ytterby, Sweden. Then came our next discovery, and because we no longer had an excuse to name it after a continent, a scientist, or a town, we named 98 after California, calling it 'californium.'

"The *New Yorker Magazine* was so intrigued with this," Dr. Seaborg chuckled, "that they accused us of lacking confidence in our own future. They said we should have named 97 and 98 'universitium' [university] and 'ofium' [of] thus leaving room for our next discoveries to be named after Berkeley and California. I wrote the editor a letter, pointing out that while we might not have had confidence, we certainly had foresight because the next two elements might be discovered in New York and named 'newium' and 'yorkium.'

"As things turned out," Seaborg went on, "the next two elements, 99 and 100, were discovered by us and two other groups, not in the laboratory but in the debris of the 1952 'Mike' H-Bomb explosion in the Pacific. We agreed to name these elements in honor of the two greatest scientists of the Atom Age. Element 99 became 'einsteinium,' and Element 100 became 'fermium.' The next element, 101, was discovered after we tried an impossible experiment with einsteinium. We had only an invisible fraction of this material, and when we bombarded it in the cyclotron we produced just one atom of Element 101 per experiment. But it proved to be enough for us to identify. We named it 'mendelevium,' after the great Russian scientist, Mendeleev, who was responsible for the Periodic Table. The final element, 102, we haven't named yet."

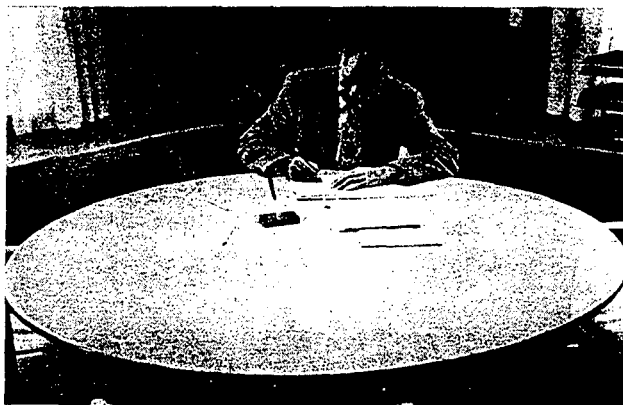
"Where will all this end?" I asked.

Dr. Seaborg shrugged. "It's open," he said. "We can



"I've always enjoyed football . . . still join my five youngsters in baseball, and I love to play golf. I even take the seven-year-old to the links."

In his new role as a university chancellor, nuclear physicist Seaborg uses a big circular desk which allows plenty of room for the constant stream of scientists and educators coming into his office.



keep on going as long as we have instruments capable of identifying these radioactive elements. As we go up the scale, however, the element's life grows shorter and shorter. It dies before we can analyze it. But in the next 15 years I suspect that with sharper techniques scientists will discover elements up to 106."

Dr. Seaborg shifted his long legs. "This has been so fascinating," I said, "that I almost hesitate to bring up a new subject. But I think our readers would like to know how you determined to be a scientist. Did you collect butterflies as a kid?"

"No," Dr. Seaborg smiled. "I was never interested in science while I was growing up in Ishpeming. That's a mining town in Michigan where I was born. When we moved to Los Angeles, however, things were different. In my junior year at David Starr Jordan High School I took a course with a chemistry teacher named Dwight Logan Reid. He made chemistry the most fascinating thing I had ever encountered. His lectures sparkled with anecdote. His experiments held me spellbound. He really loved his subject, and I couldn't help loving it, too. Then and there I decided to make chemistry my life work."

"You've never been dissatisfied with this choice?"

"Never. There is no thrill like that of making a discovery, of finding a new land."



Although the problems of education present a new challenge to Glenn Seaborg, he is still a scientist at heart. Several days

each week, he takes his lunch in a paper bag and eats with his old friends at the Radiation Laboratory on the Berkeley campus.

"What do you think is the outstanding quality for success in science?"

"Hard work," said Dr. Seaborg promptly. "I mean it. Often I worked through the night. My success was the result of application, of working a little harder than others, of sticking to a problem until it was solved."

"I understand, however, that you managed to do a million other things at the same time. Weren't you the University of California representative to the Pacific Coast Conference?"

"Yes, for five years. I've always enjoyed football. As a kid I was too light for the high school team, but I played in neighborhood leagues. I still join my five youngsters in baseball, and I love to play golf. I even take the seven-year-old to the links. Scientists are normal people, you know."

As if to prove it, Dr. Seaborg spoke proudly of his weekend projects at his ranch-style home in suburban Lafayette—of the rosebushes he had planted, the brick walls he had laid, the lawn he had put in. He owns three TV sets, including a portable. He prefers popular music to classical, his favorite reading outside science is biographies, particularly those of Irving Stone.

Dr. Seaborg was leaving for Geneva to attend the Atoms-for-Peace conference and I wanted his reactions

to the future of atom power. I had heard, I pointed out, that we are lagging behind other countries, notably England, in industrial applications.

"We don't need nuclear power as fast as England," Dr. Seaborg said, "because we are not as hungry as they are for fuel. We can afford to build on a broader base. However, in power for vehicles, such as submarines, we're as far along as anybody."

Dr. Seaborg went on to say in answer to further questions that he was in favor of exploring opportunities to curtail the nuclear arms race, that he believes in stronger cultural and commercial ties with Russia, and in strengthening our teaching of science in the school system. "Science," Dr. Seaborg said flatly, "should be taught as early as the first grade."

Finally, I asked Dr. Seaborg why he, a Nobel Prize-winning pure scientist, had accepted an administrative post as chancellor. Seaborg smiled thinly, as though he had faced this question a number of times before.

"To me it's a new challenge," he replied at last. "Having found my satisfactions in science, I wanted to see what I could do in the way of helping to solve our nation's biggest problem, education. But of course," he added quickly, "I intend to keep my hand in the laboratory. After all, I'm still a scientist."—THE END.

NEW BERKELEY CHANCELLOR

Letter from U.C. 10/58
Glenn T. Seaborg, Professor of Chemistry, was named Chancellor at Berkeley to succeed Kerr. Seaborg will continue to serve as Associate Director of the Radiation Laboratory, and his research team will remain intact to continue work under his direction.



SEABORG

Chancellor Seaborg is noted for his research on the transuranium elements, for which he and Professor Edwin M. McMillan received the Nobel Prize in Chemistry in 1951. Since 1940, he has been co-discoverer of all nine artificial elements between plutonium (element 94) and the recently discovered element 102. The scientist received all his education at the University, taking his A.B. degree on the Los Angeles campus and his Ph.D. at Berkeley. He is the only University alumnus who has been named "Alumnus of the Year" by the Alumni Associations of both the Los Angeles and Berkeley campuses.

Letter from the UNIVERSITY of California



VOLUME 1

NUMBER 4

OCTOBER, 1958

Dear Fellow Californian:

The University of California is entering on one of the most challenging periods of its distinguished career -- a period to be marked by substantial expansion of its student body, staff and physical facilities. At the same time, we face the parallel challenge of an almost explosive expansion of the field of man's knowledge. Before us lies the prospect of having more to learn and more to teach to more students than ever before.

The job which confronts us will be difficult, but no one can say it will be dull! I hope all of you share in some measure the sense of excitement with which I view the years immediately ahead for the University.

Success will require the cooperation of all of us, but it will also require something more--initiative, determination, new ideas, adventurous thinking. Your suggestions, criticism and comment about University policies and procedures will be specifically sought on many occasions, and will be most welcome at any time.

I look forward to participating with you in the vital task of building an ever better University to match the ever greater needs of modern society.

Clark Kerr

President,
University of California



INSTITUTE OF TECHNOLOGY AND ENGINEERING

Roger Revelle, Director of the Scripps Institution of Oceanography since 1951, has been given the additional appointment of Director of the La Jolla campus' new Institute of Technology and Engineering.

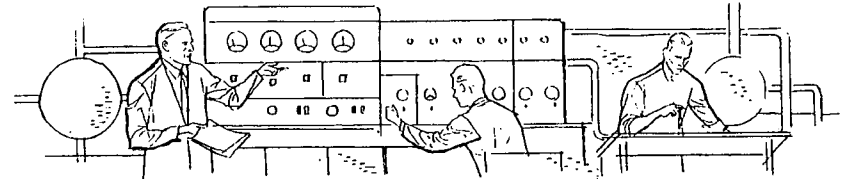
The Institute was established by the Regents at their July meeting to provide graduate instruction and



REVELLE

research in mathematics, physics, chemistry, the biological and earth sciences, and engineering.

Except for service with the Navy during World War II, Revelle's entire professional career has been with Scripps. He joined the staff in 1936 after receiving his Ph.D. there, where his major field was submarine geology. He became acting director of Scripps in 1950, and Director in 1951. Immediately after the war he served with the Office of Naval Research and was in charge of oceanographic measurements at the Bikini atomic bomb tests in 1946. He is a member of a number of scientific societies, including the National Academy of Sciences.



NUCLEAR TRAINING REACTOR

An accident-proof nuclear training reactor has been presented to the Los Angeles campus through a \$203,350 gift by the Atomic Energy Commission. The 10 kilowatt Argonaut Reactor will be used by the College of Engineering as an operating model from which students can learn at first hand about nuclear reaction and safety control.

Actual operation will be handled by faculty members and graduate students. Undergraduates in some 24 classes bearing on nuclear engineering will watch operations through large windows from a raised control room.

According to Thomas E. Hicks, Associate Professor of Engineering and Chief Reactor Supervisor, "the Argonaut will be an ideal training tool, large enough to demonstrate engineering problems, and small enough for safe handling by graduate students. Its addition will make UCLA one of the best-equipped American campuses in the field of nuclear engineering."

SOUTHERN RESEARCH REPORT

Total expenditures for research in the fiscal year 1956-57 at the four southern campuses

of the University have increased almost 400 percent over research expenditures in 1948-49, according to the annual report on research of the Graduate Division, Southern Section.

More than half of the \$11,000,000 total went to support research in medicine (\$3,774,860) and oceanography (\$3,642,044). Distribution to other fields was: life sciences, \$1,176,406; physical sciences, \$1,131,358; engineering, \$876,045; and "all other"—including the humanities and social sciences—\$550,717.

Sources of the total were: government contracts, \$5,513,118; government grants-in-aid, \$1,840,605; non-governmental gifts, \$1,232,758; University budgeted funds, \$2,564,952.

"There is every evidence," the report noted, "that the extra-mural support received has permitted conduct of research that would not have been undertaken under existing University budgets. There continues to be ample evidence that the extramurally supported projects do not appear to have modified appreciably the traditional philosophy of graduate instruction and that they have provided needed and valuable facilities for research of academic quality pursued in the academic tradition."

CHALLENGING PROBLEMS FACE UNIVERSITY IN COMING YEARS

Some of the most challenging years of the University of California lie just ahead.

More students than ever before will be seeking to benefit from its offerings: Conservative estimates indicate that over 100,000 will be applying for admission by 1970, two and one-half times the number now accommodated on the University's eight existing campuses.

More knowledge than ever before will be available for their assimilation: The scientific information necessary for competent performance in many fields—including physics, medicine, engineering, chemistry, oceanography, psychology—is increasing with almost explosive rapidity.

At the same time competent educators know that the student must not neglect such fields as history, political science, the arts and languages, because experience has shown that broad training is highly important for the development of leadership.

The University confidently expects that it will be able to meet these as well as the other challenges that face it in the years ahead under the competent leadership of its new President, Clark Kerr, and those he is calling upon to help him. President Kerr has spoken of his new appointment as both an honor and a challenge:

"The appointment as President of the University

of California, with its many campuses, is both an honor and a challenge. To me it is a great privilege to follow President Robert Gordon Sproul, under whose leadership the University has become one of the great educational institutions of the world. I cannot fail to thank the Regents for the opportunity for service they have given me."

Kerr brings to his new position experience from service in government, labor-management relations and arbitration, teaching, and academic administration. He secured his Ph.D. at Berkeley in 1939 after work at Swarthmore College (A.B. 1932) and Stanford (M.A. 1933). He taught economics at Stanford and at the University of Washington before coming to the Berkeley campus of the University of California in 1945. He served as Director of the Institute of Industrial Relations from 1945 until 1952, and then as Chancellor of the Berkeley campus until he assumed the presidency on July 1 of this year. He has held numerous government posts and served on many fact-finding boards, and has made a distinguished record as a successful conciliator of many of the nation's toughest labor disputes.

Since taking office he has made a number of key appointments to various top-level administrative posts. These include:

NEW VICE-PRESIDENT

Harry R. Wellman, Vice-President—Agricultural Sciences, was named Vice-President of the University, to assist President Kerr in the discharge of many of his duties as President and to act for President Kerr during his absence, except that the Vice-President shall not act as a Regent. Temporarily, he will continue to serve as Vice-President—Agricultural Sciences.

Wellman joined the staff of the College of Agriculture in 1925 as Extension Specialist in Agricultural Economics and became a Professor in that field in 1940. In 1942 he was appointed Director of the Giannini Foundation of Agricultural Economics and in 1952 he was named Vice-President—Agricultural Sciences.

In the latter capacity Wellman is the chief statewide administrative officer for the agricultural interests of the University.

As a research scholar, Wellman is best known for his work in price analysis, particularly of California canned fruits, and in marketing and agricultural policy.



WELLMAN

NEW BERKELEY CHANCELLOR

Glenn T. Seaborg, Professor of Chemistry, was named Chancellor at Berkeley to succeed Kerr. Seaborg will continue to serve as Associate Director of the Radiation Laboratory, and his research team will remain intact to continue work under his direction.

Chancellor Seaborg is noted for his research on the transuranium elements, for which he and Professor Edwin M. McMillan received the Nobel Prize in Chemistry in 1951. Since 1940, he has been co-discoverer of all nine artificial elements between plutonium (element 94) and the recently discovered element 102. The scientist received all his education at the University, taking his A.B. degree on the Los Angeles campus and his Ph.D. at Berkeley. He is the only University alumnus who has been named "Alumnus of the Year" by the Alumni Associations of both the Los Angeles and Berkeley campuses.



SEABORG

NEW SANTA BARBARA CHANCELLOR

Samuel B. Gould, President of Antioch College, Ohio, was appointed Chancellor of the University of California, Santa Barbara, effective July 1, 1959.

The name has also been changed from "Santa Barbara College"; and in a statement of intent recommended by President Kerr, the Regents declared their intention of developing the Santa Barbara campus into a general institution of higher education, including graduate programs, and of preparing physical plans for a capacity of 10,000 students.

Until Chancellor Gould arrives next year Elmer R. Noble, who has been named Vice-Chancellor, will be the chief campus administrative officer, a post he has been occupying for the past three years.

"After a long quest for leadership for this important campus," President Kerr said, "I am delighted that President Gould has accepted our invitation. His record at Antioch is outstanding. He will bring to the Santa Barbara campus and community a combination of talents that will go far in bringing recognition to this division of the University of California. After 14 years within the University family, the Santa Barbara campus can now move forward with new leadership, a new name, and new and expanded responsibilities."



GOULD

McMILLAN SUCCEEDS LAWRENCE

Edwin M. McMillan, Nobel Laureate and professor of physics at Berkeley, has been appointed director of the University of California Radiation Laboratory to succeed the late Ernest O. Lawrence, Nobel Laureate and inventor of the cyclotron.

President Clark Kerr, of the statewide University, and Chancellor Glenn T. Seaborg, of the Berkeley campus, announced the appointment following action by the Regents of the University.

McMillan, a native Californian, is one of the nation's most distinguished research physicists, and he is a member of the important General Advisory Committee of the Atomic Energy Commission. An Associate director of the Radiation Laboratory since 1954, he was appointed several weeks ago by the late Dr. Lawrence to be deputy director.

"Dr. McMillan is a man of great stature, intellectually, and as a man of scientific accomplishment, Dr. Seaborg pointed out. "He made discoveries that permitted some of the most important exploitation of the potential of Dr. Lawrence's cyclotron."

In 1940 the new director, with P. H. Abelson, now of the Carnegie Institution in Washington, D. C., discovered element 93, neptunium. This set the stage for the discovery of the atomic energy material, plutonium, element 94, and the other elements heavier than uranium, up through element 102.

He also discovered, in 1945, a principle which permitted the development of the giant post-war accelerators, including Berkeley's giant Bevatron, with energy ranges of hundreds of millions and billions of electron volts.

NEW RESPONSIBILITIES RECOGNIZED

Coincidental with the announcement of the appointment of Samuel B. Gould as Chancellor at Santa Barbara, the title of Provost, heretofore applied to the chief local administrative officers at Davis and Riverside, was also changed to Chancellor.

This action makes Chancellors of Stanley B. Freeborn of Davis and Herman T. Speith of Riverside.

The change in title for the chief local administrative officers of these three general campuses of the University, President Kerr said, recognizes the great responsibilities these campuses have in the growing University and their status as equal partners in the University with other general campuses.



McMILLAN

PROVOST AT SAN FRANCISCO

The appointment of Dr. J. B. deC. M. Saunders as provost of the University of California Medical Center, San Francisco, and Dr. Willard Fleming as vice-provost has been announced by President Clark Kerr, of the statewide University.

Dr. Saunders will continue as Dean of the School of Medicine, San Francisco, and Dr. Fleming as Dean of the College of Dentistry.

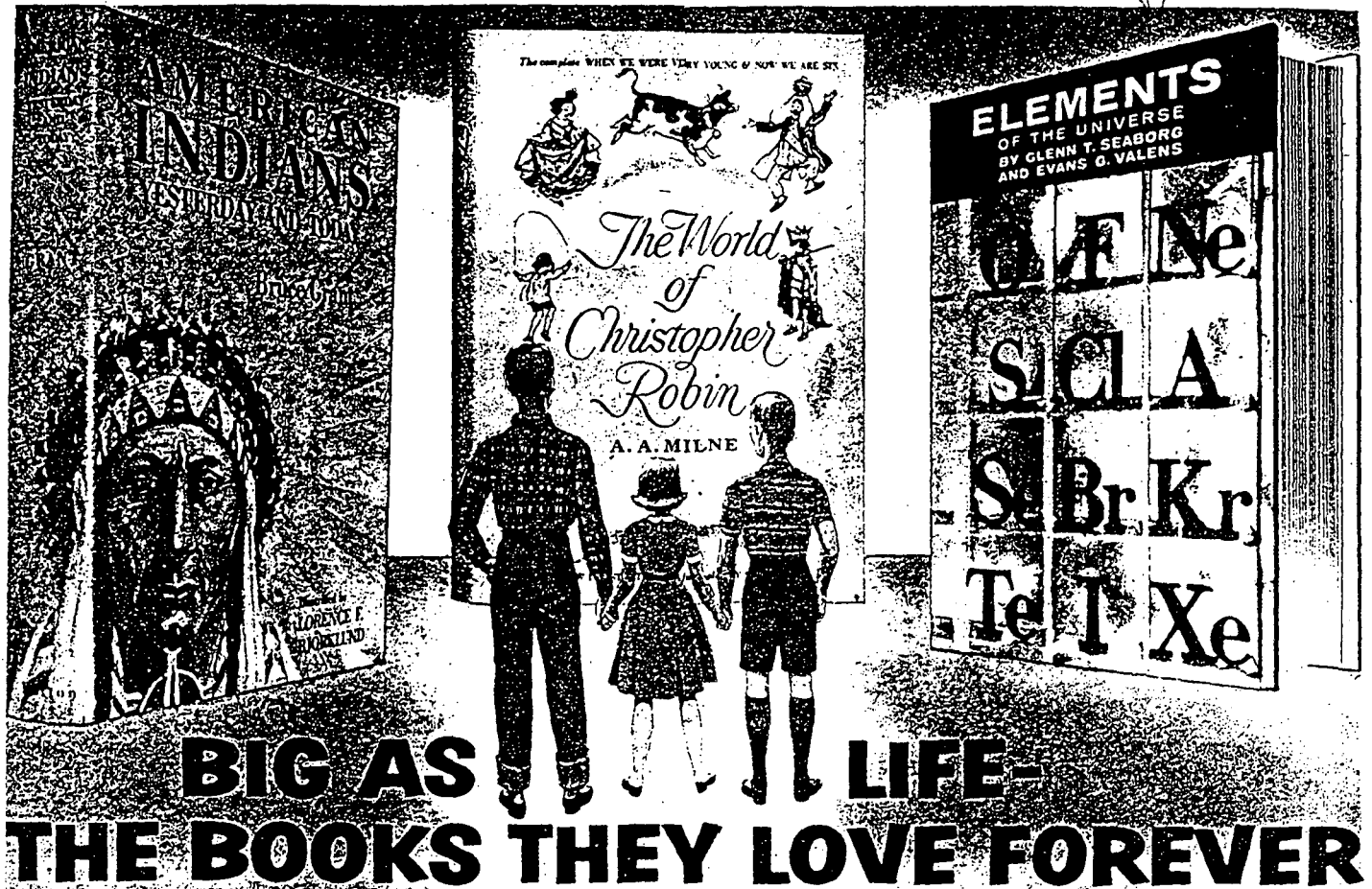
In his new position as Provost Dr. Saunders will be the responsible administrative chief of the Medical Center, San Francisco, and Dr. Fleming will be his deputy.

Provost Saunders, a member of the faculty of the School of Medicine since 1931, is a distinguished researcher in a wide range of medical problems, and he has authored major works in medical history.

Vice-Provost Fleming, a member of the College of Dentistry since 1923, is an authority on pyorrhea and a leader in studies of dental curriculum and aptitude tests.



SAUNDERS



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Glenn Seaborg, Faculty Research Lecturer

The Committee on the Faculty Research Lecture, Berkeley campus, unanimously recommends as Faculty Research Lecturer for the academic year 1958-1959 Glenn Theodore Seaborg, Professor of Chemistry and Chancellor at Berkeley.

Professor Seaborg was born in Ishpeming, Michigan, April 19, 1912. In 1922 his family moved to Southern California where he later enrolled at U.C.L.A. and received his A.B. degree in chemistry in 1934. Even as an undergraduate he was fascinated by the exciting new developments in nuclear physics and he read in this field and took such courses as were presented. In his graduate studies at the University of California at Berkeley he chose for his thesis research to work on the inelastic scattering of neutrons—at that time a strange enterprise for a chemist.

After receiving the Ph.D. degree in 1937, Seaborg was chosen by Gilbert N. Lewis to be his research associate. He spent two fruitful years working with Professor Lewis on the concepts of generalized acids and bases, and this period also saw the beginning of his studies on artificial nuclear transmutation. In 1939 Seaborg was appointed Instructor in the Department of Chemistry and, two years later, Assistant Professor. The war years were highly eventful for him, and at the war's end he returned to Berkeley as Professor of Chemistry and Director of the Chemistry Division of the Radiation Laboratory. In 1954 he was appointed Associate Director of the Radiation Laboratory. His service to the University went beyond the area of science and included his function as Faculty Athletic Representative. In 1958 he was appointed Chancellor of the Berkeley campus.

Work with Isotopes

During the pre-war years Seaborg, with Dr. J. J. Livingood, published almost 30 papers on new radioactive isotopes. Some of these isotopes, such as I^{131} and Fe^{59} , were to assume roles of major importance as chemical tracers and in medical diagnosis and therapy. In the fall of 1940 he began his epoch-making investigations of the transuranium elements. Following the work of Professors E. M. McMillan and P. H. Abelson on the discovery of element 93 (neptunium), Professor Seaborg and co-workers first identified an isotope of element 94 (plutonium), Pu^{239} . By that time the war

had started and the potential military importance of this discovery and others which followed made it mandatory that they remain in classified reports until fighting had stopped.

Discovery of Plutonium

In 1941, Seaborg and his co-workers discovered the fissionable isotope of plutonium, Pu^{239} , and undertook an intensive study of the chemical properties of this element. Since it had been decided that the plutonium work of the (as yet unorganized) Manhattan Project would be centered at the University of Chicago, Seaborg, in April, 1942, obtained a leave of absence from the University and, with a small group of co-workers, went to Chicago to take charge of the chemical work for the separation of plutonium. Much of the basic research done in those eventful few years was published after the war in two large volumes, *The Transuranium Elements*, of which he was an editor and co-author.

The war years also saw the development of one of Seaborg's other great talents, that of the organization of large research programs. His prodigious capacity for retaining first-hand knowledge of the research efforts of individuals numbering in the hundreds has resulted in a unique form of direction for a large laboratory. His influence on the whole development of nuclear chemistry in this country has been profound and most of the leading nuclear chemists in this country and abroad trace their training directly to him and his immediate associates.

Seaborg is probably best known for his work on the discovery of transuranium elements. In addition to plutonium (element 94), he and his co-workers are responsible for the discovery of each succeeding new element through element 102. The total body of new findings constitutes one of the

UNIVERSITY BULLETIN—Nov. 3, 1958

milestones in the progress of science. Seaborg is responsible for much of the work on the chemistry and electronic structure of the heavy elements as well as for that on the nuclear properties of their different isotopes. He brought forth the actinide theory of these elements which gives them their proper place in the periodic system as a transition series analogous to the rare-earth elements.

Founding of Modern Nuclear Chemistry

Under Seaborg's leadership whole new bodies of methodology and instrumentation have been pioneered. These practices are the cornerstone of modern nuclear chemistry and include radiochemical techniques, a multitude of specialized radiation-analyzing equipment, ultramicro-chemistry for chemical investigations on minute amounts of synthetic elements, and the methodology associated with transmutations with nuclear reactors and accelerators.

Professor Seaborg's award of the Nobel Prize in Chemistry in 1951 heads the long list of honors that he has received. Among the others are: Harrison Howe Memorial Lecturer at the University of Rochester (1946), William Conger Morgan Memorial Lecturer, U.C.L.A. (1946), Award in Pure Chemistry of the American Chemical Society (1947), Nieuwland Lecturer at the University of Notre Dame (1947), William H. Nichols Medal (1948), John Ericsson Gold Medal of the American Society of Swedish Engineers (1948), University of California Alumni Award (1948), election as a foreign member of the Royal Swedish Academy of Engineering Sciences (1949), Foster Lecturer, University of Buffalo (1951), Fellow of Royal Society of Arts (England, 1951), Phi Lambda Upsilon Lecturer, Ohio State University (1952), John Scott Award and Medal of the City of Philadelphia (1953), Dickson Achievement Award of U.C.L.A. (1953), William Pyle Phillips Lecturer at Haverford College (1953), Centenary Lecturer of The Chemical Society (England, 1956), Perkin Medal by the American Section of the Society of Chemical Industry (1957), E. C. Franklin Memorial Lecturer, University of Kansas (1957), Silliman Lecturer, Yale University

(1957), Joseph W. Kennedy Lecturer, Washington University (1958). He was elected to membership in the National Academy of Sciences in 1948, and the American Philosophical Society in 1952.

A number of civic groups have also honored him for his outstanding achievements. In this category of recognition is his selection by the U. S. Junior Chamber of Commerce as one of the "Ten Outstanding Young Men of 1947."

Seaborg has held offices in professional societies and served on a number of important advisory boards. He was appointed by President Truman for the period 1946-1950 to the original General Advisory Committee to the Atomic Energy Commission. He has

held a number of offices in the American Chemical Society and was a member of the editorial and advisory boards of several of the Society's journals. Other advisory boards on which he has served include the National Research Council, the national laboratories of the Atomic Energy Commission, and the Department of Defense.

Since his research career began in 1936, his writings have been both voluminous and distinguished. He is an author of about 155 papers in the general subject areas of nuclear chemistry and physics including some major definitive reviews. To date he has been author, co-author, or editor of seven books dealing with various aspects of his fields of specialization.

The Committee holds that Glenn Theodore Seaborg's scientific accomplishments and reputation make him a richly fitted person to deliver the Faculty Research Lecture, and takes great pleasure in moving his election as Faculty Research Lecturer for 1958-1959.

R. T. Birge
M. Calvin
G. C. Evans
W. F. Giauque
E. M. McMillan
Mrs. A. F. Morgan
S. C. Pepper
E. C. Tolman
M. B. Emeneau, Chairman

Yearning for Learning

THIS week KQED, our community owned television channel 9, opened up the doors to the largest little red schoolhouse in the world. Educators from coast to coast are watching the project with great interest.

Heretofore KQED has directed its efforts largely to diversified programming for thinking adults and young people in their homes. Starting Monday KQED began telecasting directly to classrooms in 40 public school districts in the Bay Area directly involving 140,000 students and 4500 teachers in grades from Fifth to Twelfth (despite the fact many schools did not have TV sets on hand for the opening day).

KQED calls it "the most ambitious TV teaching project ever undertaken," adding a total of 14 hours of teleclasses a week to KQED's schedule.

Just what the students themselves think of it is not known yet but I welcome their comments—either signed or unsigned.

The schedule is far too complicated to go into here but lectures are scattered throughout the day—largely in the morning and early afternoon—and range from story telling (fifth graders) to introductory physics (tenth to twelfth graders) plus special teacher-education courses.

As UC's Glenn T. Seaborg said: "We have entered a new age, and a new education to meet it is long overdue. Our own survival is at stake. We are being forced to improve as well as extend education."

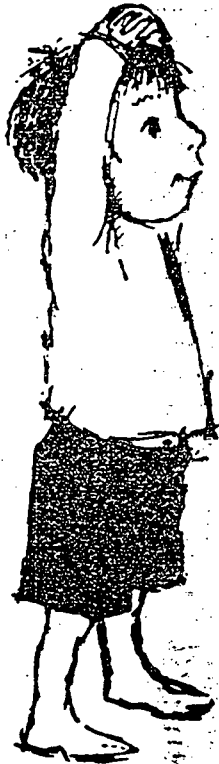
☆ ☆ ☆

IN NEW YORK recently Charles Van Doren had this to say about TV's ability to teach: "The greatest medium for communicating ideas is the spoken word. The second greatest is the written word. I wouldn't put TV very high on the list. I have a feeling that the visual element gets in the way. I wouldn't be surprised but what radio is better. A book is the best of all."

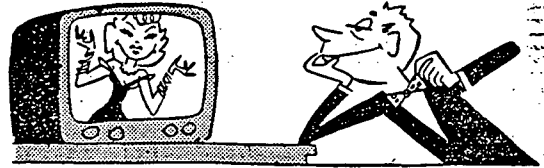
A television course which combines the best features of all three should be a perfect solution.

Judging from the first three days of KQED's teleclasses it appears that what is needed most are imaginative visual aids and teachers who inspire as well as merely instruct. Ever since Channel 9 went on the air I have hoped that it would perhaps discover another Dr. Frank Baxter hidden somewhere in the Bay Area among the blue books and the blackboards. Certainly KQED is on his trail—wherever he may be.

The station's latest scoop will be the presence of California's new Governor, who will inaugurate the first current events course for in-school viewing (today at 11 a. m. Channel 9). . . . KPIX's exclusive films of the papal coronation are repeated today at 9 a. m.



TERRENCE O'FLAHERTY



JOINT U. S., RUSS ATOMIC STUDY HINTED

UC's Seaborg Tells of
Plan for Moscow Trip

By WILLIAM BOQUIST

America and Russia may embark on a cooperative venture to discover new chemical elements, the University of California's Nobel laureate Glenn T. Seaborg disclosed yesterday.

Seaborg said he and a colleague, Albert Ghiorso, hope to travel to Moscow early in December to discuss the possibility with their Russian counterparts.

The proposal first came from a Russian scientist, G. N. Flerov, during the second Atoms for Peace meeting last September in Geneva.

SCIENCE MEET.

Seaborg discussed recent research on transuranium elements during closing sessions of the National Academy of Sciences in Berkeley.

In the last two decades 10 new elements heavier than uranium, element 92, have been discovered. None of them is found in nature, but they may have existed briefly when the earth was first born.

A major role has been played by UC scientists in all of the so-called "transuranium" discoveries.

The element with perhaps the most curious history, Seaborg said, is number 102. Its unusual background led to the Flerov proposal.

Last year an international scientific team from the Argonne national laboratory, England's Harwell research station, and the Nobel Institute of Physics in Stockholm claimed to have discovered it. They selected Nobellium as its name.

VAIN EFFORT.

Ghiorso and his colleagues, here, carefully following the Stockholm techniques, spent months in a vain effort to discover 102. Finally, with reluctance, they announced that they had failed.

After the Stockholm work was announced the Russians tried, also without success, to duplicate it.

Eventually the Ghiorso group did discover 102 by using their own techniques.

At the Geneva conference Flerov told Seaborg the Russians were anxious to be considered in the naming of the element, and proposed a joint effort on future research with Berkeley.

CAUGHT FANCY.

"This caught my fancy very much," Seaborg said, "not only as a means of bettering international relations but to speed up our work."

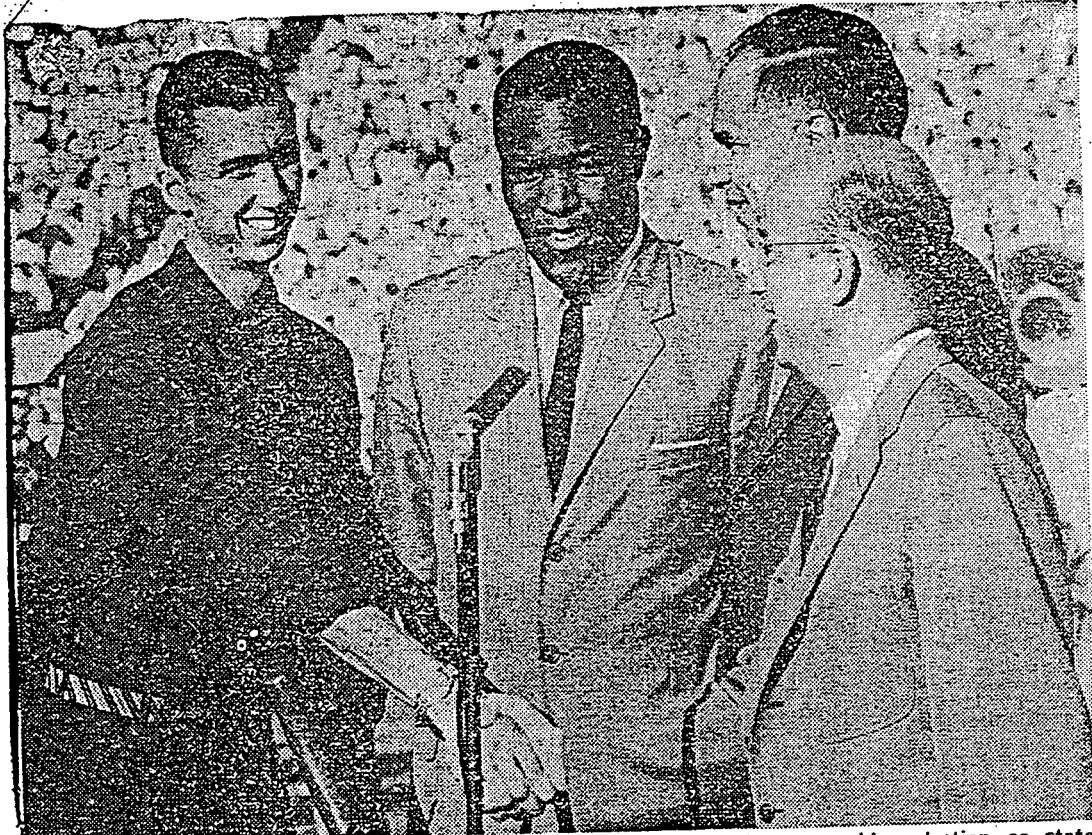
One of the reasons it appealed to him is that progress in this field depends on the use of a so-called high neutron flux atomic reactor. The United States has no such machine, but the Russians are building one.

"If we don't get busy," Seaborg said, "all the new elements will begin to have Russian names."

Seaborg described a second method of discovering transuranium elements, by collecting the debris from hydrogen bomb explosions.

In the future, he said, new discoveries might well be possible with specially designed fusion devices exploded under the auspices of several nations.

UC Has the Greatest, All Right



America's only sub-4-minute miler, Don Bowden, left, is congratulated upon his selection as state universities' athlete of the past school year by the new UC president, Clark Kerr, right. The '58 Bear track captain, who goes into the service this Winter and naturally is pointing for the 1960 Olympics, was presented the award at halftime of the Bear-Bruin football clash by UCLA's Rafer Johnson, middle, the world decathlon champion who earned the trophy the previous year. Also elated at popular Don's honoring is the noted scientist, Dr. Glenn Seaborg, behind President Kerr, who recently stepped out of Cal's faculty athletic representative position.—Paul Matheson photo

"We have all got to learn more about science," Chancellor Seaborg told the Berkeley Rotary Club in a luncheon address.

"Those out of school should read books on science and those in school must apply themselves so as to be able to meet the great challenges today." Mathematics is, of course, basic to such studies.

"In the future scientific knowledge will be demanded for many jobs and a knowledge of science will be needed just to vote intelligently," Seaborg said.

"We learned in the recent 'Atoms for Peace' conference in Geneva that the United States is ahead at present in the development of nuclear fission power. However, we may not be there for long as the Russian government is now building a heavy flux nuclear reactor, which builds up heavy transuranium elements, while we have been unable to get our Government to provide the huge sums needed for such a tool.

"This means that we may very well have to take advantage of the Russians offer to work together in this field and use their reactor.

"As a matter of fact the Russian scientific programs and ours are more alike than those of any two other countries. We seem to be inevitably developing along similar lines," Seaborg observed.

Science Study Vital to All, Says Seaborg

Berk. Gazette 11/13/59
Scientific literacy must become a part of our liberal arts education, according to Glenn T. Seaborg, chancellor of the University of California and one of the country's outstanding nuclear scientists.

Dr. Seaborg Sees Water Catastrophe

11/15/58

A "water catastrophe" could face the Nation within 20 years, according to Nobel-prize winning chemist Glenn T. Seaborg.

He told a conservation conference here that "nothing effective is being done to prevent" the threat of an extreme water shortage.

Seaborg, chancellor of the Berkeley campus of the University of California, said water already is approaching the vanishing point in some areas of the country.

He warned that a solution to the problem will require "a real effort rather than a pious hope."

Seaborg cited the predictions of British economist Thomas Malthus, who forecast that population would outstrip the world's food supply. These predictions, he declared, "acquire new immediacy as the world's population doubles every 40 years."

The two-day conference was attended by 150 US conservation leaders. It was sponsored by the university, the California Department of Natural Resources and the California Conservation Council.

11/18/58

Seaborg Speaks

'Survival Unsure'

By MARGARET WILSON

Solving the problems that are posed by physical resources will depend to a high degree on intelligent development of human resources, according to Chancellor Glenn T. Seaborg, in a speech before the Conservation council conference Friday.

"Education and research will determine whether man can survive in the face of growing population pressure on a dwindling resource supply," explained Seaborg.

Science and technology have become increasingly important forces in society thereby allowing universities to grow in importance too, Seaborg said.

To illustrate his point, he reviewed the contributions of universities stressing the present and projected research activities at the University, being most familiar with the Berkeley campus in his present role as chancellor.

Of importance to the resources problems is the world population which is doubling every 40 years. The Institute of Human Development at the University is in the process of studying the forces influencing population growth, he noted.

Seaborg in his discourse on the increasing world population reminded his audience of Edward Teller's year old prediction in which Teller surmised that "exponentially-increasing population may make colonization of another planet necessary within the next two or three centuries."

More population also means more mouths to feed and resource problems with water and food result. However, "calorie" has become almost an impolite word in the United States today, and more people seem to be bothered by over-eating than by under nourishment," Seaborg said.

"Water is now our most carelessly wasted resource, and is fast becoming our most precious one.

"We are no longer living on our water 'income', annual rainfall, but are drawing heavily on our water 'capital,' the underground reservoirs built up by natural processes over thousands of years," Seaborg said.

Study on water resources is presently being conducted by the department of chemical engineering at the University with emphasis on conversion of salt water to fresh water, added Seaborg.

While the food problem becomes more acute, the department of food technology in the College of Agriculture at the University is experimenting with a process for making algae palatable, stated Seaborg.

Though resource problems are numerous, collective intelligence may by-pass the limitations of food, water, energy and materials, and our nation may avoid certain irreversible mistakes. "The most obvious and final of our possible mistakes would, of course, be a thermonuclear war," stated Seaborg.

Seaborg further explained that one of these wasteful mistakes is the use of the world's resources. The United States with its lead in the consumption of goods and services in the world, consumes a disproportionate amount of the world's resources of energy and raw materials.

In establishing a perpetually-expanding production as the central goal of our economy, this makes necessary a continually expanding consumption to keep pace with it, added Seaborg.

Another irreversible mistake would be failure to support adequately the activities of institutions concerned with education and research, stated Seaborg. The University's many contributions are an aid toward solving resources problems and by implication our survival problem as well.

A Bookman's Notebook—



Glenn Seaborg Explains The Chemical Elements

S.F. Chronicle

11/21/58

William Hogan

ONE OF the season's most intriguing books for teen-agers turns out to be one that most adults could read with profit. It is "Elements of the Universe," by Glenn T. Seaborg and Evans G. Valens. If youngsters in the high school age group—to say nothing of their scientifically naive parents—seek to learn something about modern chemistry, this is the place to start. For why begin with anything less than the best authority?

Dr. Seaborg, Chancellor of the University of California, is co-winner of the 1951 Nobel Prize for Chemistry. He is co-discoverer of nine of the 102 chemical elements, the only man in recent times to have made a major change in the Periodic Table of Elements. Beyond that, Dr. Seaborg and his collaborator feel that science should be a part of the repertoire of a cultured man today, and plunge right into the pleasant task of making science challenging and exciting to any curious person who picks up this book.

The book is based on the series of ten half-hour programs made by KQED in San Francisco, and filmed in the so-called "cave room" of the UC Radiation Laboratory deep in the Berkeley hills. It is the story of chemistry from an "untraditional" point of view—what an element is; when and how the natural elements were dis-

Elements of the Universe. By Glenn T. Seaborg and Evans G. Valens. Dutton; 245 pp.; illus.; \$3.95.

covered; how they are distributed in the universe and put to use.

This is all simply explained for those not already versed in chemistry, as the authors put it, and written specifically to intrigue high school students. Yet it seems a safe bet to acknowledge that most intelligent high school students today know more about basic chemistry than their parents do.

This is why I think the Seaborg-Valens book is much more than a "juvenile" in the accepted sense. It is a simple explanation of a vast, challenging and increasingly sophisticated subject which the layman of any age, equipped with a sense of curiosity, might welcome eagerly.

Notes on the Margin

... Poets Gary Snyder and Philip Levine will read for the Poetry Center on Sunday, 8:30 p. m., Telegraph Hill Neighborhood Association, 555 Chestnut street.

... K. C. Ingram of Carmel Valley, whose book "Winning Your Way With People" was a success in 1949, is the author of "Talk That Gets Results," which McGraw-Hill has just issued. It deals with the symbols—spoken, written and kinetic—that people use in their efforts to persuade others or to get across ideas or information. Mr. Ingram is a member of the National Society for the Study of Communication and of the International Society for General Semantics.

... C. Y. Lee's book, "The Sawbwa and His Secretary: My Burmese Reminiscences," will be published in the spring by Farrar, Straus and Cudahy. In this the Sausalito writer recounts his experiences in Mangshih, one of the Shan states on the China-Burma border where he spent three years (1940-43) serving as a secretary to the state's ruler, the Sawbwa.



Glenn Seaborg

UNIVERSITY OF CALIFORNIA

Office of Public Information

Phone ASherberry 3-6000, Ext. 734 • Berkeley 4, California

Release

Saturday Afternoon
Nov. 22, 1958

(Housh)

Translation of Russian technical literature, solely by means of electronic equipment, is the goal of a new research undertaking which was announced today by Dr. Glenn T. Seaborg, Chancellor of the Berkeley campus of the University of California.

Made possible by a grant from the National Science Foundation, the project will call upon the joint facilities of the Computer Center and the departments of linguistics and Slavic languages and literatures on the Berkeley campus. It will be unique in that it will utilize the experience and training of professional linguists to work upon this complex problem.

The U.C. plan, if successful, would make possible readable translations from the Russian at a cost of slightly more than one cent per word--about one-half the cost of human translations. In addition, a workable system would alleviate the current critical shortage of human translators.

Dr. Sydney M. Lamb, lecturer in linguistics, will be in active charge of the program, while administrators and technical consultants of the project will include Dr. Louis G. Henyey, professor of astronomy and director of the Computer Center; Dr. Mary R. Haas, professor of linguistics; and Dr. Francis J. Whitfield, professor of Slavic languages and literatures.

(more)

00749

Analysis of materials for the project will be carried out during the next several months in conjunction with the University's IBM 701 computer. Next spring, with the installation of an IBM 704 on the Berkeley campus, operations will be transferred to the larger machine. In addition, an IBM 650 Ramac will be made available to the project at the IBM research laboratory in San Jose.

The IBM 704, a large-scale digital computer, will produce the actual translation from Russian to English, while the relatively inexpensive IBM 650 Ramac will operate as a mechanical dictionary, feeding its information into the 704. The use of two separate machines is essentially an economic measure. Without this innovation of using the low-cost machine for the time consuming task of "looking up" items in the dictionary, the process could not be made less expensive than human translation.

The investigators plan to confine their studies to but one area of science during their initial inquiries--the field of biochemistry. To provide a working dictionary for this science, they estimate that from several hundred thousand to a million words will have to be analyzed for the mechanical dictionary.

This large amount of material is necessary so that the machine can learn to deal with the several thousand words which have more than one possible meaning. For the machine to provide readable translations, it will have to be instructed as to how to deal with a specific word in different contexts.

The mechanical dictionary will be contained on what is known as an IBM Ramac file, which may be likened to an electronic storehouse of facts. One such file will provide ample storage for a single area of science.

(more)

Future adaptation of the system to other areas of science should require only that additional dictionary files be added to the same 650 Ramac. No changes should be necessary in the programming of either the 704 or 650 installations.

The development of machine translation systems is becoming possible only because of recent advances in two widely separated fields. Prior to the development of modern high-speed electronic computers, with large memory storage facilities, investigators could not have begun to cope with such a complex problem. On the other hand, only in recent years has the mechanical structure of written language become well enough understood so that it can be handled by a computer.

The researchers stressed the fact that it is only within an area in which precision in expression is a necessity, such as the various fields of science, that machine translation is likely to become feasible. For a satisfying translation of Tolstoy or Dostoyevsky we shall probably always rely upon the human translator.

#####

Frederika Knows Her Atoms, We Never Had a More Stimulating Visitor'

Greek Queen 'Good Enough To Get Job as Researcher'

By JOHN F. ALLEN

If Queen Frederika ever doffs her royal robes and has to look for a job, there's one awaiting her as a research associate in the University of California nuclear physics department.

This was the carefully considered employment offer yesterday of Edwin McMillan, Nobel laureate and director of the University's Radiation Laboratory.

He meant it too, because Ed McMillan is not a man given to meaningless statements, just to be polite.

INFORMED QUESTIONER.

After a morning spent with the Greek Queen inspecting the awe inspiring atom splitting machines, McMillan had this to say:

"We have never had a more stimulating visitor. I mean that. And that includes not just the celebrities, but the scientists who visit here.

"I'd be delighted to take her on as a researcher any time. She knew what she was talking about. Her questions were searching and informed.

She reached the tag end of things. You go down and down and down, smaller and smaller into the heart of the atom and the heart of its nucleus.

"And the Queen wants to know what are nuclear particles made of? Here we have to confess our ignorance."

TUTORED IN PHYSICS.

In preparation for her trip and for an understanding of Greece's first atomic reactor, which will "go critical" next week, the pert and disarmingly pretty Queen has been tutored twice a week for the past two years in atomic physics from a Greek scientist.

The reactor, a small, swimming pool research type, is a gift to Greece from the United States Atomic Energy Commission, and is expected to spark a concentrated research program in Athens.

The Queen was up early yesterday morning in her 16th floor suite at the Mark Hopkins, and breakfasted, according to wide eyed hotel staffers, on a man sized order of ham and eggs.

Leaving Princess Sophia still asleep, the Queen was in the lobby by 9 a. m., an early hour considering Monday's strenuous day of official rounds.

She was dressed in a smart suit of coffee and cream colored wool, a brown and blue feathered turban and matching alligator bag and low heeled shoes.

HOURLONG BRIEFING.

Accompanied by a bevy of AEC officials and two plainclothes cops, the Queen was whisked across the Bay Bridge at a 70 mile an hour clip.

She was greeted at the radiation laboratory administration building by McMillan,

Edward Lofgren, Glenn Seaborg, Luis Alvarez and a dozen more of the men who are as at home in the sub-microscopic world of the atomic nucleus as the Queen is at a royal reception.

Her hosts gave her a preliminary briefing, which lasted just under an hour.

From the administration building the little Queen, looking tinier still among the long, lean physicists, strolled to the huge circular building in which nests the incredible bevatron, America's most powerful atom smasher.

From a balcony within the building she looked down over the immense, cement enclosed machine — which whirls atomic bullets around at an incredible energy of over 6,000,000,000 electron volts — while Lofgren explained its workings.

ABANDONS THE PRESS.

Later she stopped enraptured before the big console control board from which the bevatron is run, enthralled by the flashing lights, the dials, the levers and all the rest of what makes the room look like a child's dream of a space ship cockpit.

Her next stop was at one of the Rube Goldberg-looking



IN ATOM LAND — Queen Frederika, on a tour of the University of California's atomic facilities, is greeted by Chancellor Glenn Seaberg (right) and Edwin McMillan, director of the Radiation Laboratory.

bevatron take off stations. where the ruptured nuclei are detoured out of the speeding circle, and into cloud chambers and other devices designed to help identify the exploded particles.

For the rest of her stay on the Berkeley campus, the Queen abandoned the press, politely but firmly she demanded that they leave her. This was a job to be done, a curiosity to be quenched.

For what happened during the rest of her scientific tour reporters had to rely on the memory of McMillan.

"This was really unique," he said. "We've had plenty of famous scientists up here on the hill who asked less penetrating questions than this impressive woman. It's a pretty good sign when a visitor asks the sort of questions — both physical and philosophical — that none of us can answer."

Her Majesty's impressive knowledge encompassed even the terribly esoteric field of anti-matter, which theoretical physicists suspect composes a sort of unseen, through the looking glass infinity or opposites.

Was it possible, the Queen

asked, that other inhabited planets in the cosmos (postulated recently by the university's Melvin Calvin to exist in the millions) are unseen by us because they are anti-matter.

"That," said McMillan, "is quite a question, and one I think that had occurred to none of us."

Also, of course there was no answer, but the Queen of an ancient land which germinated modern philosophy allowed herself a philosophical observation:

"I suppose it's possible that the anti-matter world seeks the world of matter, as we seek for an understanding of anti-matter. The observer and the observed are both parts of a great unity."

One episode typified the graciousness that has so charmed her own people and Americans.

McMillan said that he noticed the Queen's eyebrows rise in sudden memory as she was introduced to Thomas Ypsilantis, one of the university's more brilliant young physicists.

"I assumed," McMillan said, "that it was just because she'd recognized a Greek name. But not at all. She talked with Tom for a long time in Greek and it was only afterward that we learned the story.

"While the Queen was in Salt Lake City, Tom's mother, who lives there, was part of a Greek delegation that met Her Majesty. Mrs. Ypsilantis boasted to the Queen about her brilliant son and asked her to carry a mother's message of love. "And that's what the Queen was doing."

From the science tour, the Queen was driven to the El Cerrito home of UC President Clark Kerr.

It was a pleasant, informal reception. And the Queen, punch cup in hand, wandered among the guests.

That, partly done, it was back to San Francisco for the

time budgeted Queen—there to change and appear for a special dinner at the Press and Union League Club.

Today, there'll be more of the same for Frederika, as all plan visit to the University of California Atomic Energy Commission nuclear laboratory at Livermore.



Queen Frederika of Greece flashes her famous smile on arrival at the University of California atomic research laboratories here. With her majesty are Dr. Edwin McMillan, center, director of the UC Radiation Laboratory, and Dr. Glenn T. Seaborg, chancellor of the University.—Gazette photo

Greek Queen Inspects UC Atom Plants

[Continued From Page One]

charming self for the few moments she posed for photographers, but no one was permitted to put questions to her.

Later in the day UC President Clark Kerr was host at a reception for her at his El Cerrito home. Guests included many of the scientists she had talked to earlier in the day.

CINERAMA

Tonight she will attend a dinner hosted by the Press and Union League Club in San Francisco and attend a premiere of a Cinerama movie.

Tomorrow she will tour the Radiation Laboratory in Livermore, as she pursues her quest for knowledge on atomic energy. In the afternoon she will tour Muir Woods and return in time for the concert of Maria Callas in San Francisco's Civic Auditorium.

The Queen arrived in San Francisco Monday from Los Angeles. A small welcoming delegation headed by San Francisco Mayor George Christopher greeted her.

The Queen and her daughter, Princess Sophia, greeted the delegation from the platform of her private railroad car.

After breakfast at her San Francisco hotel, she attended a reception at the San Francisco City Hall.

After the reception they met leaders of the local Greek colony, lunched and did a little window shopping before attending a private dinner party.

Chemistry Award Received; Grunwald of UCLA Honored

For the fourth time in 12 years, a University of California, Los Angeles, graduate has won the American Chemical Society's \$1,000 award in Pure Chemistry—awarded annually to "the scientist under 36 years who has made the outstanding contribution to chemical research in North America."

The award was made to Ernest M. Grunwald, now at Florida State University. Starting at UCLA as a freshman and taking his Ph.D. degree in 1947 under Saul Winstein,

Grunwald was chosen for his original research in physical and organic chemistry, especially in the fields of thermodynamics and kinetics.

The 35-year-old chemist follows in the footsteps of three other UCLA alumni who have won the "longest-haired" chemistry award in the last 12 years.

First was Glenn T. Seaborg, Nobel Prize winner, a leader of the atomic bomb project, and Chancellor of the University's Berkeley campus. A 1934 graduate of UCLA, Seaborg won the Chemical Society award in 1947 as a pioneer in nuclear chemistry and discoverer of six new elements.

He was followed in 1948 by his classmate, Winstein of UCLA, one of a handful of world leaders in the relatively new field of physical-organic chemistry. In recognition of this and other accomplishments, Dr. Winstein was named UCLA's "Alumnus of the Year" for 1957.

Daily Cal

MONARCH

Berkeley, California, Wednesday, November 26, 1958



QUEEN FREDERIKA OF GREECE is welcomed by Chancellor Glenn T. Seaborg in front of the Ernest O. Lawrence Radiation Laboratory. The Queen arrived at the University yesterday to confer with Edwin McMillan, radiation laboratory director, and other scientists on the application of atomic energy to biological research.

PERSONALS BY PETERSEN



If my syntax seems shaky, blame it on the backlash of hurricane Helene. This is being written during a rough passage across the Bay of Fundy from Yarmouth, N.S. to Bar Harbor, Me. We found New Brunswick and Nova Scotia, land of the

Bluenose and Herring-choker, not unlike parts of the Puget Sound country.

While stopping at a service station in Ishpeming, Michigan, I asked to see the phone book. The attendant could not at first locate it and asked: "Do you know someone in town?" "Not exactly," I answered, "but I'm quite certain that a friend of mine came from Ishpeming and I was wondering if his family might still be here." "What is his name," he inquired. "Seaborg, Glenn Seaborg," I answered. "Oh yes, he came from

here and is real famous. They had a testimonial dinner for him here in town a few years ago. He was awarded a noble prize."

Well, it looks like **Bob Larsen** is going to be transferred right out of the California Section. Bob, who was Chairman in 1950, will assume managership of the Thornton Research Center at Chester, England. **Francis Bollo** will succeed Bob as director of the research laboratory at Shell's Martinez refinery.

Ted Vermeulen is undergoing a three-week workout as an ACS tour speaker. Armed with two lecture subjects and two seminar topics he will hit 13 cities, speaking more than once in several of them. In fact one brave community requested the works—all four, that is. His orbit includes San Diego in the South, goes as far east as Denver, and north to Spokane and Seattle.

Bill Dauben's account of time spent on a National Science Foundation Senior Fellowship should make him the envy of all of us. He spent a Spring semester at MIT and the Summer at Caltech with full time available for reading, studying, thinking, discussing, and nary a worry about administration and teaching matters. Take it from Bill: "A return to grass roots thinking in chemistry even for only a few months, is like a new lease on life and an opportunity to see the woods in spite of the trees."

OCTOBER ATTENDANCE

DINNER 65
ASSEMBLY 125

Health: What people are always drinking to before they collapse.

We wonder if you heard about the lawyer who got his client a suspended sentence? They hung him.

One teen-ager to another: "He hasn't actually kissed me yet, but he steamed my glasses a couple of times."

THE VORTEX

NOV 1958

A Nation 'Foolishly Indifferent'

Seaborg: U. S. Must Boost School Funds

Federal aid to education should go far beyond the program Congress approved last year, University of California chancellor Glenn T. Seaborg said here yesterday.

That bill authorized over \$1 billion in Federal aid, though only \$40 million has been appropriated so far.

Seaborg, a Nobel prize winning professor of chemistry, addressed more than 200 college and university administrators gathered to hear Federal officials explain the provisions of the new law. The day-long meeting was held in UC Extension headquarters here.

Seaborg welcomed the program as "an initial step in a new way for American education." But, he said, it "falls far short of the needs of our advancing technological society."

One of the basic reasons it falls short, he said, is inadequacy of financial support and, he added:

"I do not see how we can avoid the conclusion that a large part of the money to finance adequate educational development must come from the Federal government."

Seaborg criticized the 1958 law's provision for loans to students as not going "nearly far enough."

The nation has been "culpably and foolishly indifferent" to the development of its human assets, the most important assets it has, he said.

Scholarships, he said, would be far more effective than loan funds.

Likewise Seaborg criticized the program to aid newly-established graduate study programs as inadequate, since, he said, well-established programs also need help.

He approved the assistance offered to the teaching of modern foreign languages, science and mathematics, and the provisions for developing guiding, counseling and testing programs.

Commenting on the support for research and experiment in the use of television and other audio-visual aids, Seaborg said he believes television has much to contribute to education.

UC's professor Harvey White on the NBC program Continental Classroom (KRON, Monday through Friday, 6:30 a.m.), is now "reaching more students than in all his years of regular instruction at the University," Seaborg concluded.

"It is an understatement to say that he is conducting the largest class in the history of education, and this in the vital area of physics teaching where an emergency exists which could not be met so promptly and effectively in any other way."

SAN FRANCISCO EXAMINER

December 7, 1958

Seaborg Book

Comprehensive Explanation

"Elements of the Universe" by Glenn T. Seaborg and Evans G. Valens; E. P. Dutton and Co., New York; 253 pages; \$3.95.

Few people in America today, as much as they might want to, can avoid realizing that we are in the

midst of a scientific revolution of massive proportions. This is especially true on this campus, where even the most iron-bound English major is besieged with news of the discoveries made by members of our own faculty.

It is doubtful, however, whether

very many of these non-scientifically educated laymen, this writer among them, really grasp the significance and the nature of what is happening to the worlds of physics and chemistry right under our own noses.

It is for this reason that we welcome with enthusiasm the publication of this book, co-authored by Chancellor Seaborg, whose work in the discovery of the synthetic elements has won him a Nobel prize.

Although described on the dust jacket as being designed for "keen young readers" it well withstands the scrutiny of older and not so "keen" readers.

"Elements of the Universe" was taken from the highly successful television series presented on station KQED, featuring Seaborg and other University scientists. As such it depends to a large extent on visual materials, photographs and diagrams, to present the basic facts about chemical elements and the recent research which has been done on them at the University and elsewhere.

In addition to Seaborg's work, the book also contains chapters by other noted scientists in the field. These include Melvin Calvin, famed for his work in the study of photosynthesis, Edwin M. McMillan, director of the Radiation Laboratory and others.

This is one of the most enjoyable features of the book—the opportunity to read explanations of their own work by some of the nation's leading scientists.

Another unusual aspect of the book is the appendix which gives among other information a concise and complete explanation of the periodic table and the naming of the elements. This is a subject which is often confusing to the layman and, as a matter of fact, for the uninitiated a reading of the appendices previous to beginning the book itself might well be helpful.

It is unfortunate that the volume does not also include a similar explanation of chemical symbols and the manner of representing chemical reactions. Although the text gives a fairly comprehensive explanation of the formulae and charts in the book, at first glance they present a formidable looking array of figures to the reader.

All this book takes is courage. At first glance, from the size of the print and the frequency of pictures, it may look deceptively simple. At second glance the figures made it look unrealistically difficult. It is neither. A careful reading of it should prove to be not only informative but even enjoyable. Even those who avoid science like the plague will find this book of value.

-Dan Silver

New Seaborg Book Out Today

A gelatin-like lump of aluminum colored with green ink played a pacifying role in America's war effort in the early 1940s.

An anecdote describing an unusual and harmless hoax involving its use is described in "The Transuranium Elements," published today by the Yale University Press and written by the University of California's Glenn T. Seaborg.

Seaborg and his colleagues at the UC radiation laboratory discovered plutonium in 1940 and 1941. The element, which could be used as an explosive, was destined to become the fuel for the atomic bomb.

But early laboratory attempts to purify it for large scale industrial production were painstakingly slow.

Nevertheless many scientifically curious visitors wanted to see the plutonium, the first element made by man.

The material was in precious short supply and had to be used in lab experiments. So Seaborg prepared a display, complete with test tube, and a little lump of aluminum hydride in a solution of green ink.

To each visitor eager to see the first man made element he would carefully say, "This represents a sample of plutonium hydroxide."

More often than not the visitor would deceive himself into thinking he had heard that it was indeed a sample of plutonium.

New Seaborg

Book Out Today

S.F. Exam. 12/7/58

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Tribune photo

EXCHANGE VIEWS—Nine Soviet educators on a three-day visit to the Bay Area met with Glenn T. Seaborg, chancellor of the University of California. Here (from left) are Sergei Grigorevich Shapovalenko, Dmitri Nikolsevich Taptikov, Shiiab Sagindykovich, Chancellor Seaborg,

shaking hands with Aleksei Ivanovich Markushevich, delegation leader; Khasan Rashidovich Rashidov, Arsenii Sergeevich Makhov, Sergei Konstantantinovich Karstev, Nikolai Vladimirovich Mostovets, and Anatoli Alesandrovich Smirnov.

U.C. Chancellor Shares One Opinion With Visiting Soviets

BERKELEY, Dec. 6—There's one opinion, at least, that U.C. Chancellor Glenn T. Seaborg, Nobel laureate, shares with visiting Russian educators.

That is that American schools have been derelict in teaching mathematics and the exact sciences.

Nine Soviet educators, interested not only in higher education but in American methods through all educational levels, expressed their views during a busy day on the Berkeley campus. They were flanked by interpreters, representatives of the U.S. Office of Education and motion picture cameras.

The visitors were here as observers, expressing appreciation for university hospitality, as part of a three-day stay in the Bay Area on their

nationwide tour.

Aleksei Ivanovich Markushevich, first assistant minister of education and Moscow University scientist, as spokesman for the party, talked of Russian and American educational methods and theories.

Answering a question on science teaching in American schools, he said:

"It is my impression that in recent years a lot is being done in American schools to raise the level of education in mathematics and the exact sciences.

"But, as a professor of mathematics at Moscow University, I, personally, think that there is a great deal to be done in your country in this field."

"Tell him that I agree!"

Markushevich praised the reciprocity plan under which an American educational delegation visited the Soviet Union and the present tour of his group was arranged with official auspices.

As to the Soviet philosophy of education, he explained:

"We have based our program on the theory that each person in the Soviet Union should receive a full-value education well-rounded for the development of personality.

"We feel that each person must be well prepared to take his part in production or constructive work of the whole participating society.

He said Russian children are taught that war isn't inevita-

Orphan Atom Rings U.C. Fire Alarm

By RENNIE TAYLOR

BERKELEY, Dec. 6—(AP)—

University of California nuclear researchers rigged a hookup that caused a single, strange new kind of atom, hidden among a billion other atoms, to ring a fire bell.

They needed the loud warning so they wouldn't have to watch an instrument panel for hours at a time in the hope of seeing a single tiny flash of light that would herald the existence of the new atom.

Once the atom signaled its existence, they had to rush quickly into the billion atom collection and try to sort out the newcomer for chemical tests which would prove it to be a new man-made element.

The hookup worked fine un-

til the fire department learned about it and vetoed all further operations with the bell, says Dr. Glenn T. Seaborg, leading figure in the discovery of new elements heavier than uranium, the weightiest one of the regular chemicals.

RELATED IN BOOK

Dr. Seaborg, Nobel Prize winner and now Chancellor of the Berkeley campus, told about the makeshift scientific gadget in a book just published by the Yale University Press.

In the book, "The Transuranium Elements," Dr. Seaborg discloses for the first time what he calls seemingly foolish procedures which he and other researchers used because they appeared to be the

best ways of tackling certain problems directly.

The fire bell was in the hall of the chemistry building and was not supposed to sound a general alarm. The researchers were keeping its operation all to themselves, but somehow the word got around.

Anyway, the hookup helped the scientists toward the discovery of Element 101, which they named Mendelevium. It is the ninth of the 10 transuranium elements so far found. The last one to be discovered, Nobelium or Element 102, came too late to be included in the book.

PROCESS EXPLAINED

The heavy man-made elements have come from bombarding natural uranium,

which is Element 92, with atomic particles from cyclotrons. The heaviest ones have been made by bombarding certain of the lighter man-made atoms. This was the case with Mendelevium, which was produced by shooting cyclotron projectiles into Einsteinium, Element 99.

The researchers used a billion atoms of Einsteinium—all they could find in this country's atom supply—for the experiments.

Even this huge number was too small to be weighed and when spread on a tiny bit of gold foil cyclotron target was invisible. Yet the researchers were able to detect even one of the atoms when it had been changed into Mendelevium.

(Release Tuesday Afternoon, Dec. 9, 1958)

New Book Recounts Plutonium Discovery and Development

BERKELEY, Dec. 9.—An account of one of the great epics of scientific history—the laboratory creation of the synthetic elements heavier than uranium, including the atomic bomb material, plutonium—is recounted in a new book by the leading figure in this achievement, Dr. Glenn T. Seaborg, Nobel Laureate and now Chancellor of the Berkeley campus, University of California. The book, "The Transuranium Elements," is published by the Yale University Press.

One of the important components of the book, constituting about one-third of it, is the first full history of the discovery of plutonium and its development in World War II as an explosive for the atomic bomb.

Dr. Seaborg was the leader of the groups at Berkeley who in 1940-41 discovered plutonium and the fact that it could be used as an explosive. He subsequently led a group of 100 young scientists in a dramatic crash program of research, unprecedented in chemistry, for obtaining the pure plutonium needed for the bomb.

"The story of the plutonium project was beginning to slip away from all of us who took part in it," Dr. Seaborg says. "I am indebted to many scientists for their help in putting it together."

The book, based upon the Silliman Lectures Dr. Seaborg delivered at Yale earlier this year, also describes in detail the discovery and investigation of the subsequent transuranium elements—95, 96, 97, 98, 99, 100, and 101. The discovery of 102 by the Berkeley group earlier this year occurred too late to record.

Dr. Seaborg also describes the characteristics of the heavy elements, and makes predictions about others still to be discovered.

BERKELEY GAZETTE

December 20, 1958

Berkeleyans Write Book On Elements

ELEMENTS OF THE UNIVERSE — Glenn Seaborg and Evans Valens — Dutton — \$3.95.

This is for younger readers? Well, it is, really, but we'll wager that you can learn as much from it as we did. Glenn Seaborg and Evans Valens, both of Berkeley, have pictured the science of chemistry excitingly and dramatically. With many photographs and a minimum of technical language, they talk about the recent discovery of new elements together with some talk about the atom. Their story of how the radiation laboratory at UC acts to help in discovering new elements is fascinating as is the entire story. Recommended for the entire family.

D. V.

OBITER DICTA EX CATHEDRA



Or, some passing remarks from the halls of science by a wise and witty man who proves that the ivory tower has a view—including a view of sports. And so we introduce Dr. Vannevar Bush, spectator sports expert, chairman of the corporation of Massachusetts Institute of Technology, leader of scientists—and a host of his colleagues, whose interests, as shown here, range from boxing through sailing to driving hot cars

by **VANNEVAR BUSH**

THIS is a treatise on sport, written by an expert. It contains numerous suggestions for improvement which will no doubt be welcomed by those who operate the system. However, anticipating that questions might be raised, let us first define sport and state what constitutes an expert.

For the purposes of this treatise, sport is defined as a system of propelling a ball or similar projectile for the edification of a mass audience. Thus court tennis, which is an amusement and a form of exercise, is excluded from the definition since no one has discovered how to mount a TV camera so as to view it. So is billiards, since the audience which enjoys watching a master make ivory balls behave is not mass. About every other way of causing a sphere or spheroid to move through space by throwing, carrying or hitting it with a stick or other form of bat comes in. To interest a mass audience, there needs to be present also a contest, that is, opposing individuals or groups with sharply conflicting interests in the progress of the propelled object.

Now, how do I qualify as an expert? This is simple. I once had my picture in the papers in a prominent

position, and this undoubtedly qualifies me to speak with authority. True, the reason for my picture was somewhat remote from sport, but that does not really matter. I am in the same position as Winston Churchill, who was, during the war, an expert on the application of science to weapons (although I admit he was somewhat better known to the public). I have another qualification. In college, I earned my letter in a major sport, and that confers the privilege of pontificating on sport for life. In case anyone looks up the records, I got that letter as a manager, but there was a special distinction. I managed the team that bent Eisenhower's knee. So I write without modesty or apology.

In Russia, sport as we have defined it is a state program for furthering national pride and patriotism, and it works. Here, under our free-enterprise system, it is a means for making money. Whether sport is formally a business like other businesses is in doubt. At present, the Supreme Court says that if the propelled object is hollow and oblate, then it is, but if it is spherical and solid, it is not. It certainly differs from most businesses in various ways. For one thing, some of

the employees get paid and some do not, this being a relic of the old apprentice and guild systems of England. For another, there is a form of serfdom involved, under which the performers are bought and sold. This is not in conflict with the constitutional provisions against slavery since the performer can always quit—if he does not mind sacrificing his professional skills—and start a restaurant.

It will be noted that wrestling and boxing are left out of the definition, since no projectile is involved. Anyone who thinks that wrestling is a sport is entitled to make his own definition. As to boxing, I would be inclined to alter definitions and include it, if the entrepreneurs of that system would make a couple of simple modifications. First, I would attach a belt and rope to each of these employees, so that they could reach one another readily, but not embrace. Second, I would fire the judges and award the prize money to the contestant who longest kept his rope stretched taut.

There are still amateurs in sport. An amateur is a gentleman, and a gentleman is a man who does not need to work for a living. This, of course, applies only when we consider

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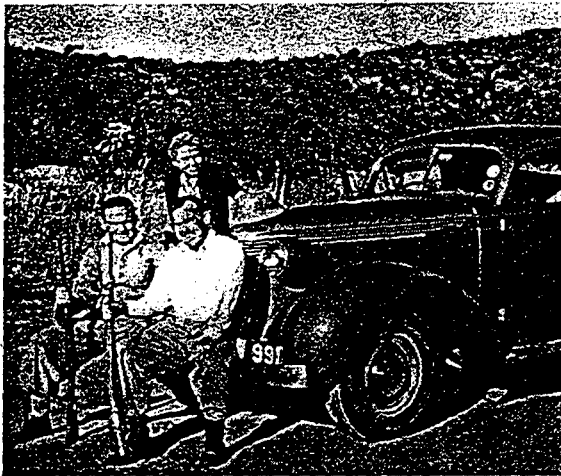


DR. ALFRED O. C. NIER, atom bomb specialist, physics professor at the University of Minnesota, swims, fishes, here runs along Cass Lake beach with his wife Ruth.

**SOME SCIENTISTS GO IN FOR SWIMMING,
SAILING, EVEN BOXING . . .**



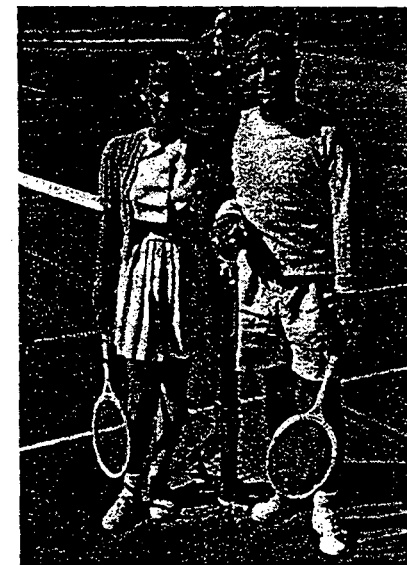
ARNOLD WEXLER, physicist and meteorologist, likes to climb mountains for relaxation, is particularly thrilled by first ascents, of which he has made 50 in 15 years of climbing on this continent.



DR. ATHELSTAN SPILHAUS, Minnesota's dean of technology, is a fisherman and hunter, likes "anything that has to do with the outdoors or the sea." Here (right) he is on an African hunt.



DR. J. ROBERT OPPENHEIMER, director of the esteemed Institute for Advanced Study in Princeton, is an ardent sailor. He is shown here on six weeks' cruise he took with his family in the Caribbean.



DR. JOSEPH E. MURRAY, experimental surgeon famous for kidney transplants, and wife are active tennis fans.

THORNTON READ, theoretical physicist at the Bell Telephone Labs, was Golden Glover, still teaches PAL kids.



DR. GEORGE I. BELL, Los Alamos reactor expert, was photographed on first ascent of Nevado Salcantay, 20,000-foot peak in Peru.

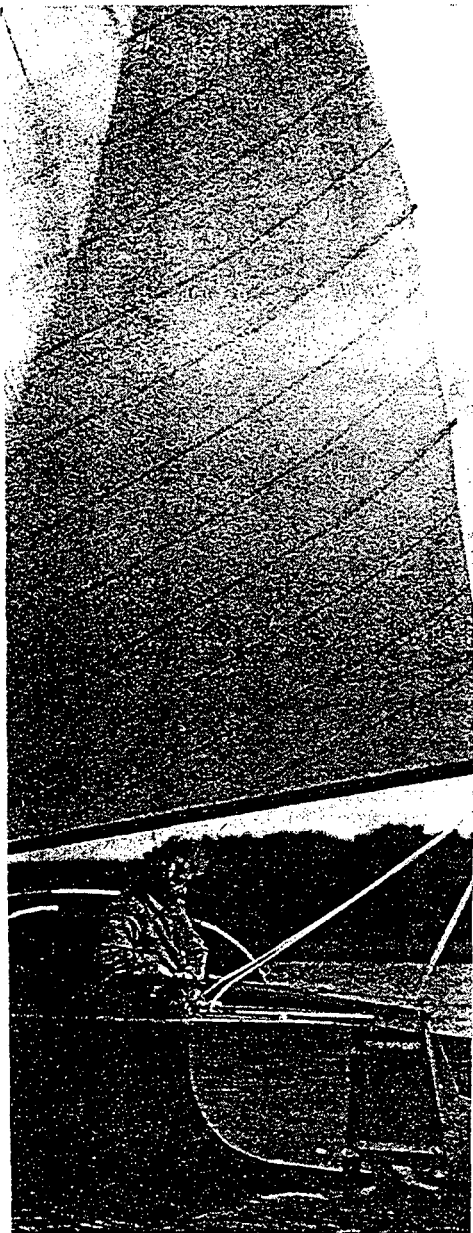
sport under the present definition. There are other kinds of gentlemen elsewhere. There are also amateurs who do not choose to perform before TV cameras and who actually play games for the fun of it. There used to be a great hassle about amateurs in football, but it is rapidly becoming resolved under the apprentice system. By this system, a hot per-

former is required to perform without compensation for several years and then is paid adequately if he qualifies for the big time. There is some problem left in the case of apprentices who are impecunious and have to eat, but ingenious alumni groups find ways around this impasse. Then, too, lots of apprentices get a lift out of roaring stands and do not seem to care if they do not share in the gate receipts, which, incidentally, some-

times amount to quite a sum of money. And there remain, I am told, contestants who still regard the spectacle as a game rather than a business. Of course, the problem would be simpler if the sport business were made entirely independent of the colleges, which may be the ultimate solution, since college presidents and trustees sometimes have strange ideas regarding business.

In tennis the problem is neatly

... OTHERS RELAX WITH FOOTBALL, SKIN-DIVING, SPORTS CARS



DR. ALBERT EINSTEIN, shown here on his sailboat in Germany in 1930, was a life-long devotee of peaceful outdoor relaxation.

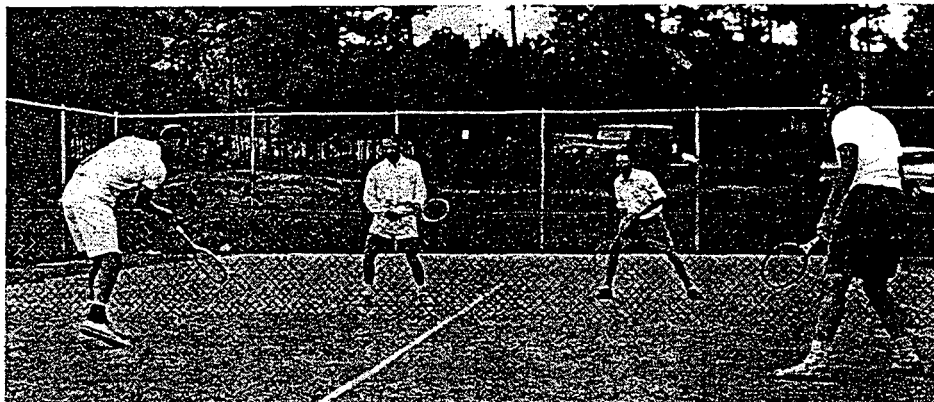
DR. THEOS THOMPSON, director of MIT's nuclear reactor, is an ex-football player who nowadays finds diversion in sport fishing.



DR. JOSEPH KAPLAN of UCLA, head of the U.S. International Geophysical Year, is a devoted football fan.

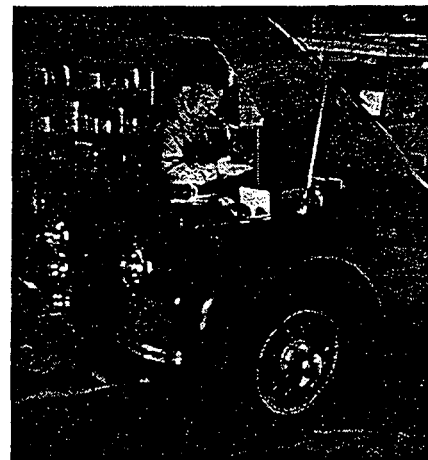


DR. EDWARD TELLER, famed "father of the H-bomb," plays his favorite game, chess, with his son Paul as his wife Mici (left) and daughter Wendi look on.



FOUR FROM LOS ALAMOS relax at doubles: (from left) Physicist James L. Tuck and Mathematician Stanislaw Ulam, both thermonuclear experts and major H-bomb contributors; Theoretical Physicists Conrad L. Longmire and Donald C. Dodder, also ranking men in the nuclear weapons field.

JOHN WILLIAMS, head of mathematics division of the Rand Corporation, turns from missiles to souping up sports cars during his off-duty hours.



solved by having a czar. He just states who is amateur and who is professional. It is easy enough for the individual player to change his status in one direction—for example by getting a man in the business to pick up a dinner check—but it is impossible to move the other way. This keeps outstanding performers from hiding their light under a bushel, where the great mass audiences will not have a proper opportunity to witness their

skill. It is a sheer loss to business, of course, when a hot tennis player is limited in the extent to which he can attract cash customers to oscillate their necks to follow the ball.

But it is important to get down to the matter of advice.

It seems to me that the managers of the business of sport have lost sight of the real objective, which is to satisfy the mass audience and keep them coming and paying. An essen-

tial ingredient is that the customers shall be convinced that the contest is intense and real; for example, that it is being played by the contestants and not by the officials. There are all sorts of crudities in this regard in present practice in the sports industry.

Imagine, let us say, that Pugwash College is manfully carrying the football down the field. By fine teamwork

continued



DR. GLENN SEABORG, who directs chemical research at the University of California's Radiation Laboratory, swims, plays occasional golf and coaches his children in backyard basketball.



SCIENTISTS ON SKIS are Professor Richard Ogg of Stanford (*left*); Dr. Joel H. Hildebrand, a top research chemist at the U. of C.; and the late Dr. Irving Langmuir, Nobel Prizewinner in 1932 for his research in chemistry.



DR. ALBERT SZENT-GYORGYI, Nobel Prizewinning biochemist and director of the Woods Hole, Mass. Institute for Muscle Research, is shown here engaged in his favorite sport, surf casting for striped bass.

DR. WERNHER VON BRAUN, the Army's top missile man, is an expert skin-diver and explorer of submarine scenery.

DR. C. GUY SUITS, director of research for the General Electric Company, is a versatile sportsman who hunts Alaskan brown bear (*below*), skis in the winter and skin-dives and sails in the summer.



and intense concentration, it is barely able to make 10 yards in four tries, and it has marched this way for 50 yards while the tension in the stands mounts steadily. Then a zebra-shirted officer throws his dustcloth on the ground, picks up the ball, moves it back 15 yards, and the drive is over. He looks intently at the TV camera and slices at his calf with his hand. This means that he has seen a case of clipping. As near as I can make out, this term means that a Pugwash player, in attempting to interfere with the progress of an opponent, has made violent contact with him below the midsection, and more than eight points abaft the bow. The stands subside, and 800 cynical customers remark, "The hell with this," to their neighbors. The reason for this cynicism is the belief, no doubt mistaken, that the official has seen a dozen cases of contact abaft the bow, and has chosen to pick on this one so that the stands

"I mountain-climb for fun and relaxation. For my vacation I usually spend three to six weeks each summer climbing some new mountain. Then there is a special exhilaration in reaching the top of a peak that has never been climbed."

ARNOLD WEXLER

will not forget that it is he who is running the show.

They do much better in hockey. Here all sorts of mayhem are allowed and enjoyed, but certain types are frowned on. A player, Joe Doakes of the Colossi, for instance, manipulates his club in such manner on the skate of an opponent that the latter's center of support is irretrievably displaced from the vertical through his center of gravity. This is called tripping. The officer in this case blows a whistle and invites Joe to sit in a penalty box for two minutes, where he can watch the game readily but not participate. The interest in the game is not spoiled, it is enhanced, for Joe's comrades are now outnumbered and strive mightily to prevent catastrophe before Joe rejoins them. The effect of enforced idleness on Joe is also said to be salutary.

Basketball seems to be the worst offender in regard to this subject of penalties. I never could make out the rules of this sport; they are very subtle. Slim Tower may be proceed-

ing down the hall, accompanied by the ball, which is propelled by oscillation between hand and floor. This seems to be all right; he can either hold onto the ball or move but is not permitted to do both simultaneously. Then Slim collides violently with an opponent, Hi Elevation. The whistle blows, and Slim is presented with a chance to propel the sphere through a draped orifice without interference, scoring a point. The question is: Did Slim run into Hi or Hi into Slim? Maybe the officer can tell; I can't. And a penalty every minute takes all the fun out of watching the game, at least for me. I much prefer hockey where, if one contestant clouts another with his implement, there isn't any doubt about who socked whom.

This leads to a discussion of fixing, which is a very sore subject. Let me assert at once that nearly all officials in any sport are undoubtedly honest, rigorously ethical, professional men, who certainly earn their salaries. I make this statement lest the reader think I am cynical. But in every business there have to be safeguards against the small minority of those who are dishonest or who do not understand the system fully or who are misled by evildoers. They need to be prevented from committing acts which are illegal, meaning contrary to the law, or unethical, meaning injurious to the business or, more broadly, to the public. This last is on the basis that what is good for sport is good for the country. Now in business we have audits and inventory counts. It seems to me that the same should be true in sport—i.e., that there would be more public confidence and support in sport if a real effort were made to render the acts of officials in every sport clear-cut and, as far as possible, in the open, where the paying guests can audit them. After all, we have had scandals. Baseball survived one by rigorous action. Basketball has had them and has gone on its way without much change.

What involves openness? Well, take baseball. Lon Chancy and the ball are simultaneously and rapidly approaching first base, and a blue-coated official is observing the impacts. He spreads his arms in an Eastern salaam, which means that, in his judgment, the foot impacted the canvas pillow some tenths of a second before the ball contacted the leather of the glove. The stands roar condemnation or approval, according to

their prejudices. But the next morning's paper carries a clear photograph of the action, showing the foot some inches above the pillow while the ball is securely captured. It may be too late to change the decision, but this sort of thing ensures that the official will be careful and objective for, if he is unduly erratic, his em-

"You'll find that professional people seek a vigorous sport that contrasts with their indoor, sedentary jobs. Physical activity in the outdoors is a natural complement to their lives."

DR. GEORGE I. BELL

ployment as an official will be in jeopardy.

It is not quite as positive an affair in regard to calling balls and strikes. The patent office is full of schemes for helping in this matter, using vertical light beams and photocells and the like. The TV camera in the outfield, which looks at the plate as though it were right behind the pitcher's box, is an enormous help. An umpire is far more constrained to objectivity by the presence of such a gadget than he is by the positively expressed remonstrations of Casey Stengel. He knows that the latter are merely a part of showmanship; that he, too, is dependent upon public interest and that he can occasionally, but not too often, enhance the enthusiasm of the cash customers by ordering the great Casey to the clubhouse. (The usual expression, I know, is ordering to the showers. But Casey does not get any exercise, so he does not need a bath.)

Another aspect of success in appeal to a mass audience is that scoring should be a rare event, built up to by strategy and a succession of purposeful acts. It is all to the good if the customers grasp the strategy partly but not fully. It is also a help if the viewers believe the strategy is being worked out by the so-called players. Yet there are all sorts of sins in this regard.

Hockey has done well. It has introduced rules, clearly understood by the initiated, involving offside and icing. These are designed to cause the attackers to carry the puck toward the opponents' goal rather than just to pass. They also allow fattening up the goal tender, by one appendage or another, until his projection on the designated opening of the cage covers a large fraction of the

useful area. The result is that goals are rare: they come only after well-planned and executed teamwork, apparent to all, and each goal constitutes an event.

Much of the lure of baseball is likewise due to suspense. The trailing team fills the bases, by inviting bases on balls, by hit and run, and by other well-known stratagems. The power hitter then comes up to the plate and strikes out, and the fans are desolate or delighted.

FOOTBALL has this element par excellence. The goal-line stand, foiled by a courageous pass, brings the crowd to its feet. The quarterback, who pulls in the defense by successive successful line plunges and then pops one over the line to an uncovered end, rouses the customers, because they were all vicariously in his predicament and searching for a neat surprise.

The worst is basketball. Goals occur every few seconds, when the game is not interrupted by penalties, which it is most of the time. There is no suspense, except on the final score, and this is likely to be 110 to 104. If there is strategy it appears to be ephemeral. The reader may gather that I do not think much of the sport of basketball. I do not. I think it ought to be radically revised or prohibited by law.

But as to other sins. In so-called professional football, which is that aspect of the business which does not use apprentices, the coach often runs the show, and the quarterback takes his orders from him. Rotating guards bring in the plays. Spotters on the roof phone the coach to apprise him of enemy weaknesses. Maybe this

"Like Ted Williams, my interest is really the outdoors and fishing. I played football in the Rose Bowl on the Nebraska team, but now football is really in the past tense for me."

THEOS THOMPSON

wins games, which helps gate receipts. I doubt it. More likely it caters to the coaches' conviction that father knows best. But I am not interested in the coaches' egos. I do enjoy watching a clever youngster thinking and planning stratagems clearly, while burly opponents knock him all over the lot without being able to jar his generalship. Substitutions, yes;

continued

someone on the sidelines has to judge these, for safety against injury due to exhaustion, for one thing. But, for my money, let the players play the game.

Baseball, for all its virtues, is not entirely immune from this, either. Obviously, there needs to be a system of signals for, let's say, a squeeze play, and the pitcher needs to signal if he is going to try a pickoff at second base. But why should the batter take orders on what to do on the next pitch from the third-base coach? And why should a pitcher be ordered to give an intentional pass, usually much to the disgust of the fans?

In tennis the officials do not do much, and I understand they do not get paid much. Mostly they sit in chairs and remark on whether a ball hits a line. They are often reviled and treated to hard looks. Part of this is for the purpose of causing a pause, for management has found that if the customers waggle their heads from port to starboard without interruption some necks crack, and this leads to damage suits. The pauses also enhance the impression that tennis players are temperamental, like artists. Otherwise, tennis is a polite sport, and the audience is anxious to give the impression of affluence. For example, in tennis if the ball goes into the stands it is usually returned to the field, whereas in other sports if a customer gets his hands on the projectile he steals it.

An extraordinary thing is that bowling has become a sport exploited for public entertainment. There's a game for you! No officials in sight, no penalties for getting involved with your opponent. No doubt about results; a pin either falls down or stands up, it does not continue indefinitely to wobble uncertainly. Suspense of a sort. I recently watched a chap named King bowl a perfect game and make 20 strikes in succession. On the 20th I was sitting on the edge of my chair, even though I was just a TV viewer without the contagion of excitement that goes with a crowd. I wish I could see slow movies of a strike; there must be some in existence. I cannot make out why a properly placed and properly rotating ball knocks all 10 pins down, while a deviation of an inch leaves some standing. One complaint I have about bowling is monotony—the more skilled the players, the more cut and

dried it seems to be. I would like to see real experts play a game in which there would be no score except when a ball left just one pin standing up. Another complaint is that the employees' salaries seem to me to be a bit meager. But it is a good game, even for a show.

Would anyone think offhand that a show could be made out of a golf game? It is a bit sticky in this regard. The reason for success, no doubt, is that there are more real nuts in this country on the subject of golf than on any other subject of public interest, even including rock 'n' roll. They have to have a special rule for the case where a pitch shot goes into the pocket of one of the gallery. Every time I watch such a contest I hear gripes that the putts are just as important as the other shots. They are, from a scoring standpoint. But a drive or an approach shot can involve an appalling amount of skill, and a putt simply involves an appalling amount of luck. Maybe a putt should count only half a shot. I would like to watch a game in which putts were omitted and the players were considered holed out as soon as they were on the green. Anything to speed it up; it is too slow for my blood. Perhaps someone will put on a match in which strokes do not count, players hit at will and the first chap into the 18th hole wins. It would at least take extra fat off the players.

SPEAKING of slowness, one of the sins in sport for mass entertainment is delay. If baseball does not do something about it, the fans will do so, by watching hockey, or maybe lacrosse or soccer, both of which, incidentally, are excellent. The pitcher steps on the rubber, holds long communion with the catcher as to what to do next, steps off, mops his brow, being careful not to get any sweat on the ball, of course, steps back on. About that time the batter steps out. Finally, the pitcher actually throws a ball. Then he and the catcher forget and chat. Then a new pitcher comes in, walking slowly from the bullpen a quarter mile or so away, throws a series of warmup pitches, although he has been warming up for half an hour, and so on. The heck with it!

However, I think I know the reason. Baseball is an old sport; it has been over the bumps and has learned. For one thing, it has learned that the public does not cotton to a situation

where the officials are too much in evidence, where they are exhibiting their erudition and impressing the crowd with their authority. Hence, umpires hesitate to enforce rules which would speed up the game. They have my encouragement to do just that. And when football officials have learned as much they will be a whole lot less in evidence, and football will be a better game.

Speaking of reforms, there is one more I wish baseball would universally adopt. It has taken years to get major league batters to wear hard hats at the plate, and even now the system is barely accepted. We do not, any of us, like to hear of a chap getting a fractured skull while doing his best to entertain us. Yet individuals will not wear protection unless all do, and top management will not order it until the public insists in one way or another. Baseball players still wear spikes. Don't tell me they are necessary for footing; I have seen better examples of maintaining footing in a soccer game in sneakers. In fact, I suspect sneakers would be a lot more secure on a wet baseball field. I like to see a chap slide into second violently to try to break up a double play, and I like to see the second baseman pop up into the air and deliver the ball to first. But I do not like to see spikes thrown at the chap. We have no bullfight mentality, I hope, when watching a ball game.

A word now about sportswriters. There are, of course, excellent sportswriters. I admire them and sympathize with them. I wonder how they survive and whether they get paid much. The writers that I turn to educate me on the fine points of the game that I do not understand. But in spite of their best efforts, I am still foggy on a lot of things. I wish they would tell me whether I am all wrong on a lot of opinions I have written in this treatise. For example, about basketball. Perhaps I just don't understand it and really ought to regard basketball as a worthy effort.

Oh, the TV commercials. I almost forgot to comment on those. Some of them are deucedly clever, and I wonder who thought them up and how they execute the trick photography. I believe they actually sell me things, which is, after all, their object. And I feel a sort of obligation to be receptive, because the outfit which put them on is paying for my entertainment and paying plenty. But there

continued

are several kinds that annoy me and cause me to resolve never to buy the product.

One is the kind that strings over and blocks my seeing a critical play. A second is the kind that springs the same skit on me 40 times. The first four times it is amusing, the 40th time it is not. What is the matter—do they run out of money or talent? Another type that gets me down is the one that has a jingle tune that penetrates into my subconscious and will not be evicted, something like garlic, pleasant at the time but annoying on recurrence. I can hardly blame the advertiser who does this if he can get away with it, but I wish he would be more considerate.

THE type that really rouses me to rebellion, however, is the ad that repeats over and over a statement which is asinine on the face of it and that I know is not true. This is done because of a conviction on the part of the advertising profession that if you tell a chap something often enough, no matter what, he will end in believing it, or at least it will get its name embedded in his cranium where he cannot get it out and will act on it in spite of himself. I do not like to be used that way or thought to be that dumb. So, if I am told a million times that Alfalfa Cigaretts will increase my innate appreciation of feminine beauty, I will carefully buy Lapedeza Cigaretts, even if I do not like them very much. I hope there are millions like me and that we can prove the advertisers wrong.

This advertising business, come to think of it, is dangerous in many ways. Now they have a scheme, I understand, for putting ideas in my mind without my seeing them or knowing anything about it. I will bet they cannot. I will bet they would be surprised at the things they sometimes do put in my mind. And I do not think I am any different in this regard from the rest of the population.

Why does the American public like to watch games? One point, of course, is that they like to see an exhibit of supreme skill. Yet this cannot be too strong an attraction, or billiards would be a feature on TV, for it is a game of consummate skill, readily depicted by a vertical camera. Another reason is the pleasure of joining a crowd, where excitement is intensified by mass psychology. Yet there are

millions who watch games on TV where no such influence is present. A strong motivation is vicarious participation. When a pitcher in a pinch, with periodic clapping going on to distract him, with heat and weariness sapping his strength, nevertheless delivers ball after ball with precision and judgment, those in the stands share with him in his ordeal and rejoice at his steadiness as they put themselves in his place. Hero worship goes along with this, of course. There is also a large group with a strange pride in being erudite, in knowing all the players and averages, in excelling at an intellectual undertaking of something even though it be utterly artificial.

Audiences like suspense, no doubt of that. But also, as noted before, they like to try to fathom planning and strategy. This is the great difference between baseball and cricket, in my opinion. I advance the thought timidly, because I do not really understand cricket; I wish I did. For one thing, I cannot fathom the system under which games are abandoned once the outcome is determined, although I believe we might adopt some such system to advantage on this side of the water, instead of the mournful finish to some of our games, killing the clock and the like. But I think the greatest attraction of baseball is this element of strategy. And I believe it is present to a far greater extent in football and that this would be quite a game if the coaches and officials would let the players play it.

Is it all foolish? Are we foolhardy to be watching games? The Russians have put up sputniks, and they use athletics only to further the designs of the state. They still say they intend to conquer the world. Must we be equally serious and concentrate entirely on matters of national prosperity and military power? We certainly need to be alert and vigorous and wise in a tough race with a tough antagonist, where survival may be at stake. But one cannot be grim all the time. And there is no better and no more healthful mental relief, in my opinion, than participating in real sport, not in sport as I have defined it. And, as a substitute for the millions who cannot directly participate, watching sport, even sport of the most crassly commercial sort, is not too bad. I only wish that those who run the business would pay more attention to the customers.

END

Scientist From Ishpeming Leads Element Hunters

By LEE EDSON
In Think Magazine

Dr. Glenn Seaborg, a native of Ishpeming, Mich., who is the new chancellor of the University of California at Berkeley and one of the world's leading nuclear scientists, was once asked what he did for a living. He is said to have replied laconically: "I discover elements."

Dr. Seaborg has devoted almost half of his 46 years to finding new building blocks of the universe

Today's Special Story

and extending our knowledge of them into domains never reached before. He and his colleagues have discovered nine synthetic elements heavier than uranium, the heaviest natural element.

One of these elements—plutonium—brought him a Nobel prize in 1951, a small fortune in patent rights, and a permanent place in history as one of the architects of the A-bomb. Recently, the University of California's famed radiation laboratory unveiled its newest discovery, Element 102, and Dr. Seaborg, still associate director of the lab, believes that Elements 103 and 104 may not be far behind.

Almost Shy Manner

Curious what all this means to us and what a modern Prometheus is like, I visited Dr. Seaborg in his office, which he'd just inherited from Clark Kerr, former chancellor and now president of the university.

Dr. Seaborg, the offspring of three generations of hard-working Swedish machinists, proved to be a lanky six-foot-two-and-a-half with dark thinning hair, rugged Carl Sandburgian features, and a quiet almost shy manner. As we shook hands, he motioned me to a couch in the corner of his office.

Source Of Nuclear Power

"Since you've virtually cornered the market on man-made elements," I began, "I'd like to know whether these new elements have any practical significance," I asked.

Dr. Seaborg smiled. "First, I haven't cornered the man-made elements market," he said. "The

first synthetic element, No. 43, was discovered in Italy in 1937, and three others which filled out the old 92-element Periodic Table were found soon afterwards.

"But to answer your question, plutonium is of course the most important of the trans-uranium elements because one of its isotopes is a source of nuclear power. As for the other elements, they all reveal new information about nuclear and atomic structure, which is of importance in discovering how to utilize atomic energy."

Troublesome Nomenclature

"How did you get involved in the discovery of these elements?"

"It started simply enough. In my senior year at UCLA I learned about the invention of the cyclotron at Berkeley, and I became so fascinated I determined to take my P.H.D. there. In those pioneer days I did most of my work with radioactive isotopes. Then in 1940, two of my colleagues, McMillan and Abelson, discovered element 93, which they named neptunium after the planet just outside Uranus. Shortly afterwards, we found Element 94, plutonium. At first, we gave it the code name of 'copper.' Then when we had to introduce real copper into our experiments, we distinguished it from the other copper by calling the latter 'Honest-To-God Copper.' This nomenclature became troublesome, so in 1942 we went back to the old-fashioned system of naming elements after the planets and we named our discovery after the last planet, Pluto."

How Others Were Named

Dr. Seaborg paused and asked whether I'd like to hear about the other elements, and how they were named. When I said yes, he continued.

"The next two elements, 95 and 96, which we found at the University of Chicago, were hard to analyze chemically, so at first we referred to them as 'pandemonium' and 'delirium.' When we finally managed to identify them, we found we had run out of planets so we named Element 95 'americium' after America because it was analogous to 'europium' which was named after Europe.

New Yorker Intrigued

"Element 96 was christened 'curium' after Pierre and Marie Curie because it was analogous to 'gadolinium,' a rare earth which bears the name of another famed investigator, Johannes Gadolin. Similarly, Element 97, which we found at the University of California after World War II, was named 'berkelium' after the city of Berkeley because it was analogous to 'terbium,' Element 65, which was named after Ytterby, Sweden. Then came our next discovery, and because we no longer had an excuse to name it after a continent, a scientist, or a town, we named 98 after California, calling it 'californium.'"

"The New Yorker Magazine was so intrigued with this," Dr. Seaborg chuckled, "that they accused us of lacking confidence in our own future. They said we should have named 97 and 98 'universitium' (university) and 'ofum' (of) thus leaving room for our next discoveries to be named after Berkeley and California. I wrote the editor a letter, pointing out that while we might not have had confidence, we certainly had foresight because the next two elements might be discovered in New York and named 'newium' and 'yorkium.'"

One Still Unnamed

"As things turned out" Seaborg went on, "the next two elements, 99 and 100, were discovered by us and two other groups, not in the laboratory but in the debris of the 1952 H-bomb explosion in the Pacific. We agreed to name these elements in honor of the two greatest scientists of the Atom Age. Element 99 became 'einsteinium,' and Element 100 became 'fermium.' The next element, 101, was discovered after we tried an impossible experiment with einsteinium.

"We had only an invisible fraction of this material, and when we bombarded it in the cyclotron we produced just one atom of Element 101 per experiment. But it proved to be enough for us to identify. We named it 'mendelevium,' after the great Russian scientist, Mendeleev, who was responsible for the Periodic Table. The final element, 102, we haven't named yet."

"Where will all this end?" I asked.

Fascinated By Chemistry

Dr. Seaborg shrugged. "It's open," he said. "We can keep on going as long as we have instruments capable of identifying these radioactive elements. As we go up the scale, however, the element's life grows shorter and shorter. It dies before we can analyze it. But in the next 15 years I suspect that with sharper techniques scientists will discover elements up to 106."

Dr. Seaborg shifted his long legs. "This has been so fascinating," I said, "that I almost hesitate to bring up a new subject. But I think our readers would like to know how you determined to be a scientist. Did you collect butterflies as a kid?"

"No," Dr. Seaborg smiled. "I was never interested in science while I was growing up in Ishpeming. That's a mining town in Michigan where I was born. When we moved to Los Angeles, however, things were different. In my junior year at David Starr Jordan High School I took a course with a chemistry teacher named Dwight Logan Reid. He made chemistry the most fascinating thing I had ever encountered. His lectures sparkled with anecdote. His experiments held me spellbound. He really loved his subject, and I couldn't help loving it, too. Then and there I decided to make chemistry my life work."

Recommends Hard Work

"You've never been dissatisfied with this choice?"

"Never. There is no thrill like that of making a discovery, of finding a new land."

"What do you think is the outstanding quality for success in science?"

"Hard work," said Dr. Seaborg promptly. "I mean it. Often I worked through the night. My success was the result of application, of working a little harder than others, of sticking to a problem until it was solved."

"I understand, however, that you managed to do a million other things at the same time. Weren't you the University of California representative to the Pacific Coast Conference?"

Fond Of Football

"Yes, for five years. I've always enjoyed football. As a kid I was too light for the high school team, but I played in neighborhood leagues. I still join my five youngsters in baseball, and I love to play golf. I even take the seven-year-old to the links. Scientists are normal people, you know."



DR. GLENN SEABORG

As if to prove it, Dr. Seaborg spoke proudly of his weekend projects at his ranch-style home in suburban Lafayette — of the rosebushes he had planted, the brick walls he had laid, the lawn he had put in. He owns three TV sets, including a portable. He prefers popular music to classical. His favorite reading outside science is biographies, particularly those by Irving Stone.

What About The Future?

Dr. Seaborg was leaving for Geneva to attend the Atoms-for-Peace conference and I wanted his reactions to the future of atom power. I had heard, I pointed out, that we are lagging behind other countries, notably England, in industrial applications.

"We don't need nuclear power as fast as England," Dr. Seaborg said, "because we are not as hungry as they are for fuel. We can afford to build on a broader base. However, in power for vehicles, such as submarines, we're as far along as anybody."

'A New Challenge'

Dr. Seaborg went on to say in answer to further questions that he was in favor of exploring opportunities to curtail the nuclear arms race, that he believes in stronger cultural and commercial ties with Russia and in strengthening our teaching of science in the school system. "Science," Dr. Seaborg said flatly, "should be taught as early as the first grade."

Finally, I asked Dr. Seaborg why he, a Nobel prize-winning pure scientist, had accepted an administrative post as chancellor. Seaborg smiled thinly, as though he had faced this question a number of times before.

"To me it's a new challenge," he replied at last. "Having found my satisfaction in science, I wanted to see what I could do in the way of helping to solve our nation's biggest problem, education. But of course," he added quickly, "I intend to keep my hand in the laboratory. After all I'm still a scientist."

January 29, 1959

Harvard President Conant to Speak Here on Education

James Bryant Conant, president emeritus of Harvard University, and ex-Ambassador to Germany, will present a free public lecture in Wheeler Auditorium, on the University of California campus, tomorrow at 8:15 p.m. Director, under a Carnegie Grant, of the American High School Study (1957-1958), Dr. Conant will speak on "The American High School Today."

Dr. Conant served as president of Harvard University from 1933 to 1953. In 1953 he assumed the post of US High Commissioner for Germany, and later became ambassador to the New Federal Republic of Germany. He is the author of numerous books in the fields of science and education. His most recent publications include "Modern Science and Modern Man," "Education and Liberty," and "The Citadel of Learning."

Tomorrow's lecture is offered by Chancellor Glenn T. Seaborg, The School of Education, and the Committee on Drama, Lectures and Music.

N.Y. Herald-Tribune
A \$75,000

Atom Prize— For Failing

1/30/59
Peace Award Goes
To Dr. de Hevesy

By Robert C. Toth

Dr. George C. de Hevesy was presented yesterday the \$75,000 Atoms for Peace Award for an "inspiring failure . . . of inestimable consequences."

As a young chemist in the physics laboratory of the famed Sir Ernest Rutherford, the Budapest-born scientist failed to achieve his assigned task of separating two substances. On that failure he built the concept of tracing radioactive atoms through physical processes.

This discovery by Dr. de Hevesy, now seventy-three, is said to be as great as the invention of the microscope. It provided the means to learn basic information about medicine and biology, as well as becoming enormously useful in industry. Last year the use of radioactive isotopes in this country saved industry an estimated \$500,000,000.

President Lauds Him

President Eisenhower sent congratulations to Dr. de Hevesy for his achievements in bringing "to mankind better health, a deeper understanding of the processes of nature and further proof of the benevolent capabilities of the human mind."

It was forty-eight years ago to the day that Prof. de Hevesy entered the Rutherford laboratory. Sir Ernest gave him his assignment in these words:

"If you are worth your salt, you will separate Radium D from all that nuisance lead."

Radium D was later found to be itself, a form of lead. As such it was incapable of being separated by chemical means of that time. Only in the 1940s was the separation accomplished by physical means in the United States atomic bomb effort.

For six years Dr. de Hevesy worked at it, but failed. But in the classical pattern associated with many great discoveries, he "turned total failure into an achievement of inestimable consequences," according to Dr. Glenn T. Seaborg, Noble Prize winning scientist and chancellor of the University of California. Dr. Seaborg spoke at the award presentation ceremony yesterday at Rockefeller Institute.

Since he couldn't separate the substances, Dr. de Hevesy decided to use this fact, plus the radioactivity of the Radium D, to trace common lead through plant processes.

For his scientific discoveries, the tall, balding chemist won the Nobel Prize in 1943. He is now professor at the Research Institute for Organic Study in Stockholm.

U.N. IS LIKE ATOM, SCIENTISTS HEAR

Hammarskjold Calls It First
Step to World Order—
de Hevesy Gets Award

Dag Hammarskjold, Secretary General of the United Nations, yesterday compared that organization's place in international politics to the role of an atom in nuclear physics.

He called the world organization "a first approximation to the world order which we need and which one day must be brought about." He said also that it was based on "the recognition of the fundamental unity of all mankind in its interest in peace and in progress based on justice and freedom."

Mr. Hammarskjold addressed 250 scientists and other notables, including eleven Nobel Prize winners, at the Rockefeller Institute, York Avenue at Sixty-sixth Street. The occasion was the presentation of the \$75,000 Atoms for Peace Award to Prof. George Charles de Hevesy, 73-year-old Hungarian-born chemist.

Professor de Hevesy, now a teacher at the Research Institute for Organic Chemistry in Stockholm, Sweden, also received a gold medallion. He was cited for his pioneering concept of using the radioactive character of certain atoms to observe their movements and interactions. In this lay the origin of the isotope tracer technique.

Detlev Wulf Bronk, president of the Rockefeller Institute, read a message from President Eisenhower praising Professor de Hevesy. The President wrote:

"He has contributed much to the advancement of mankind. Through his work he has assisted in achieving for man better health, a deeper understanding of the processes of nature and further proof of the benevolent capabilities of the human mind."

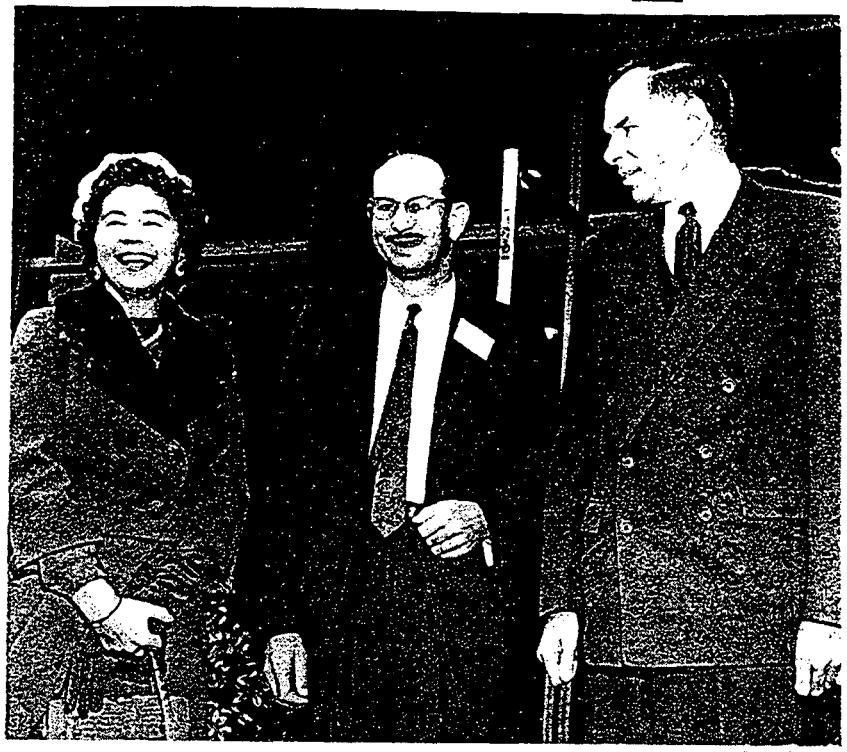
The Atoms for Peace Awards were established two years ago as a memorial to Henry Ford and his son, Edsel Ford.

Dr. Glenn T. Seaborg, chancellor of the University of California, recalled that Professor de Hevesy's "inspiring successful failure" had occurred in 1913. The resulting tracer technique had an enormous impact on the scientific world, he said, "as great as the invention of the microscope."

Her Majesty and the Atom: The University of California's nuclear research facilities at Berkeley and Livermore have had many distinguished visitors. Few, however, have proved so charming, so interested and so informed as Queen Frederika of Greece.

Under the personal guidance of the most brilliant stars in the University's galaxy of atomic scientists, the Queen spent a day visiting the cyclotron, bevatron and bubble chambers at the Lawrence Laboratory at Berkeley. The next day, under the guidance of Edward Teller, "father of the H-bomb," she toured the University's Radiation Laboratory at Livermore.

Her majesty has been studying physics for several years under the tutelage of a professor at the University of Athens. As a result, Edwin McMillan, Nobel Laureate and director of the Ernest O. Lawrence Laboratory found her a stimulating guest. "She saw more detail in the Bevatron than most experts see," he said. He admitted she asked questions the scientists couldn't answer. "I told her I'd be happy to have her as a graduate student."



QUEEN FREDERIKA, of Greece, happily greets Chancellor Glenn T. Seaborg, right, as Edwin McMillan, director of Lawrence Radiation Laboratory during two-day tour of facilities. *Betty Jane Ne...*

Berk. Gazette
**Harvard President
 Conant to Speak
 Here on Education**
 1/29/54

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Tomorrow's lecture is offered by Chancellor Glenn T. Seaborg, The School of Education, and the Committee on Drama, Lectures and Music.

CALIFORNIA MONTHLY

January 1959

Tributes to Ernest Lawrence: The Regents have renamed the world-famous Radiation Laboratory on the Berkeley campus The Ernest Orlando Lawrence Radiation Laboratory. Announcement of the rechristening was made at the recent meeting of the National Academy of Sciences by President Clark Kerr. It honors the late scientist who invented the cyclotron and created and led the Laboratory until his death last August.

At the November meeting of the Regents, plans for another tribute to the great nuclear scientist were revealed. It was announced that plans were underway to erect a museum of science at Berkeley as a Lawrence memorial. The proposed structure will house a number of permanent scientific exhibits and provide space for science fairs and similar events.

A special committee to raise funds for the memorial will be chairmaned by Chancellor Glenn T. Seaborg. Invitations to join the committee have been extended to Alfred Loomis, New York; Edward Heller, San Francisco; John McCone, chairman of the Atomic Energy Commission; Edwin M. McMillan, director of the Lawrence Radiation Laboratory; John Francis Neylan, San Francisco attorney; Rowan Gaither, Jr.; Lewis Strauss, Secretary of Commerce; Charles Thomas, president of Monsanto Chemical Company and Regents Gerald H. Hagar, Edwin W. Pauley and Jesse H. Steinhart.

"New Direction in Higher Education"— Seaborg on National Defense Education Act

(The speech which is presented below was delivered by Berkeley Chancellor Glenn T. Seaborg before a recent regional conference on the National Defense Education Act. Seaborg's remarks have been slightly excerpted.)

U. Bulletin

2/2/59

I am happy to have an opportunity to say a few words of welcome on behalf of the University of California at the beginning of this conference on the National Defense Education Act, because I am deeply convinced of the importance of this Act and of its significance as the initial step in a new direction for American education.

The factors contributing to the inadequacy of our educational system are many and complex, but one of the basic factors is the question of financial support. I do not see how we can avoid the conclusion that a large part of the money to finance adequate educational development must come from the Federal government. Moreover, I see no fundamental reason why methods for giving federal support to our educational system cannot be worked out without endangering the proper amount of local autonomy of our schools. It is my hope that the National Defense Education Act will serve as the beginning for a much more comprehensive and far-reaching program.

Oakland Tribune, Tuesday, Feb. 3, 1959



Tribune photo

VISITORS—Russian engineers shown with University of California Chancellor Glenn Seaborg (third from left) during a tour of the campus are (from left) Prof. Aleksandr Davankov, Prof. Panteleimon Lebedev, Prof. Nikolay Bogoroditski, Prof. Vasilii Atroshchenko and Prof. Kasimeras Barashauskas. They went to Stanford today.

U.C.'S SEABORG WINS SCIENCE BOOK AWARD

BERKELEY, Feb. 3 — University Chancellor Glenn T. Seaborg has received the 1958 Thomas Alva Edison Foundation National Mass Media Award for writing the best science book for youth during the year.

Seaborg received the award in New York from Edison Foundation trustee Joseph W. Barker.

The famed U.C. chemist was praised for encouraging interest in science through his book, "Elements of the Universe."

Oakland Tribune, Tuesday, Feb. 3, 1959

Tuesday, Feb. 3, 1959

Chancellor's Book Merits Award

"Elements of the Universe," by University chancellor Glenn T. Seaborg and Evans G. Valens, won the award of the Edison Foundation as "The best science book for youth"

published in 1958.

The award was announced yesterday in New York.

The award is part of the foundation's national mass media awards

program to encourage the mass media to present more material for the benefit of youth, particularly in the science field.



Dr. Glenn T. Seaborg, Nobel prize-winning chancellor of the University of California here, accepts an Edison Foundation Award for his book, "Elements of the Universe," cited as the best science book for youth published last year. The award was given him by Dr. Joseph W. Barker, an Edison Foundation trustee. Dr. Seaborg is co-discoverer of nine of the 102 chemical elements. Co-author of the book was Evans G. Valens.

February 6, 1959

Seaborg Calls For Education

Glenn T. Seaborg, chancellor of the University of California here, warned that the "lack of understanding of scientific principles among the great bulk of our working population is causing us grave injury," in a talk this morning at the university.

Speaking before the eleventh annual Industrial Engineering Institute, Seaborg asked for "basic training in mathematics and sciences in the precollege curriculum and continuing study of these subjects during the college years."

At the present time our industrial development is hampered, and hundreds of millions of dollars of our national defense contract money is being wasted because we lack technicians whose native intelligence has been developed adequately for efficient handling of their jobs."

The UC educator and Nobel prize winning scientist also called for schooling in science for business students, those who will be the "managers and personnel men who hire and guide the work of technical people." At the present time, he said, this groups lacks scientific literacy.

The meeting of industrial engineers and managers will continue through Saturday afternoon in the Hertz Music Auditorium.

Workers' Lack of Scientific Understanding Injures U.S.,

Dr. Seaborg Tells Engineers

Oakland Tribune, Friday, Feb. 6, 1959.

BERKELEY, Feb. 6 — University of California Chancellor Glenn T. Seaborg today warned that lack of scientific understanding among America's workers "is causing us grave injury."

In delivering the welcoming address to the 11th annual U.C. Industrial Engineering Institute, Dr. Seaborg declared: "Our industrial development is being hampered and hundreds of millions of national

defense contract dollars are being wasted because we lack technicians whose native intelligence has been developed adequately for efficient handling of their jobs."

The Nobel prize winning

chemist called for "basic training in mathematics and science in pre-college curriculum and continuing study of these subjects during the college years."

Seaborg told the opening session of the two-day conference that the upgrading of skilled workers will become increasingly vital as industrial processes become more automatic.

Although fewer workers may be needed to produce the same amount of goods, these workers will need greater intellectual training, he explained.

The Chancellor also stressed the importance of scientific schooling for business students,

who will become "managers and personnel men who hire and guide the work of technical people."

Seaborg predicted that the deficiencies would be overcome through greater use of educational television and extension courses.

The meeting of industrial engineers and managers will continue through Saturday afternoon in the Hertz Music Auditorium.

Lafayette Sun T. A. Edison Prize

University Chancellor Glenn T. Seaborg has been awarded the 1959 Thomas Alva Edison Foundation National Mass Media Prize for writing the best science book for youth during the past year.

Seaborg's book, "Elements of the Universe" has been cited for encouraging youthful interest in science by Edison Foundation Trustee Joseph W. Barker.

The noted U. C. scientist is a Lafayette resident. He and his family live at 1154 Glen Road.

2/6/59

S.F. Chronicle 2/7/59 Seaborg Calls for More Basic Science Training

Today's industrial technology demands more basic science training for the industrial workers, Chancellor Glenn T. Seaborg of the University of California declared yesterday.

Seaborg spoke at the 11th Annual Industrial Engineering Institute on the Berkeley campus.

Hundreds of millions of dollars are being wasted on defense contracts and American industrial development

is being hampered, Seaborg said, because the Nation lacks adequately trained technicians.

The Nobel prize winner called for more "basic training in mathematics and science in the precollege curriculum, and continuing study of these subjects during the college years."

Business students and potential personnel managers also need more science training, he said.

Daily Californian

MONARCH OF THE COLLEGE DAILIES

Berkeley, California, Tuesday, February 10, 1959

No. 6

Kerr, Seaborg Issue Welcome to Students

These words of welcome are intended particularly for those of you who are enrolling in the University of California this semester for the first time. I hope that the next few months will prove a promising beginning to a successful University career.

You are joining your fellow-students and the members of the faculty in an exciting enterprise—the enterprise of University education. Some of you have your future career firmly in mind and are making specific preparations for them; others are still in the exploring stages.

In either case, in addition to the classroom activities which are your primary responsibility, I hope that you will take advantage of the many non-classroom opportunities at the University—the organized activities, the lectures, concerts, and the other special events which fill the calendar, for education is obtained in more places than the classroom alone.

A true education cannot be defined solely in terms of semester-hours credit, essential as that formal measurement may be. It must, rather, be gauged by its impact on the whole personality and way of life of the student. This is the basis for my concern that you respond to as many as possible of the wide variety of opportunities the University has to offer you.

President Clark Kerr



CHANCELLOR
GLENN SEABORG



PRESIDENT CLARK KERR

As the spring semester opens, I should like to extend a warm welcome to all students, especially to those of you who are coming to the University for the first time.

If there is one thing in particular that a new student should remember, it is that the University is not merely an information filling station. True, I trust that each of you will acquire a significant store of knowledge. But it is even more important that you learn well the techniques of learning and of thinking for yourself, for education is but an apprenticeship for life.

Our society accepts the ideal of equal opportunity for utmost development of each individual's talents. The outstanding faculty and the extensive and varied facilities of this intellectual environment, generously provided by the people of California, give ample assurance that the opportunity is here. The rest is up to you.

In a well-rounded university experience you can acquire the wealth that will enrich your life and the lives of those around you through all the years to come.

Chancellor Glenn T. Seaborg

U.S and Russia Possess All Atomic Power They Need, Says Seaborg

By SYDNEY KOSSEN

The race between the United States and Russia in the field of peaceful use of atomic energy is almost meaningless, a noted scientist declared yesterday, because "in the long run both nations will develop as much atomic power as needed."

The speaker was Dr. Glenn T. Seaborg, chancellor of the University of California and associate director of the UC Radiation Laboratory. He delivered the welcoming address to the 87th annual meeting of the American Institute of Mining, Metallurgical and Petroleum Engineers (AIME).

The United States now is ahead, he said. But both nations are using similar approaches through the use of enriched uranium fuels.

This he described as the "breeder reactor" method. He predicted that commercial power from such a source should be available by 1980.

Doctor Seaborg expects England to be in quantity production of atomic power by 1965.

That nation, short of coal and oil to generate power, is using "a brute force method, wasteful of uranium," Doctor Seaborg said. He viewed this as justified for England but not for the United States.

4,000 REGISTER

Some 4,000 delegates have registered for the five day convention which will run through Thursday. Main events are being held in the Sheraton-Palace Hotel with panels and technical sessions also being conducted in the St. Francis and Sir Francis Drake Hotels.

Other developments yesterday:

1—Carl O. Nickle of Calgary, former member of the Canadian Parliament, urged that "Canadians and Americans should strive now for a continental approach to oil marketing." Otherwise, he warned, the Canadian Government may "go it alone" and this would tend to lessen cooperation in other fields, too.

2—In a review of foreign petroleum developments, H. W. McCobb, Standard Vacuum Oil Company vice presi-



DR. GLENN SEABORG
"... U. S. is now ahead"

dent, said "1958 was characterized as a year of industry-wide over capacity."

3—Richard W. Hillyer of Houston said the American oil industry, too, has many problems but in general the outlook for 1959 is healthy and strong.

4—J. W. Woomer of Pittsburgh, incoming president of the institute's mining section, called for greater co-operation with South American countries for the development of mineral resources.

5—Natural gas should be freed from price control and permitted to compete in the open market with other fuels, according to a joint paper by Warren B. Davis and Lloyd Schweizer Jr., both with Gulf Oil Corporation, Pittsburgh.

DATA FROM GENEVA

Doctor Seaborg spoke on "This Nuclear Age" at the institute luncheon. He said his information on Russia's progress came from the two Geneva conferences on the peaceful use of atomic energy.

He described the first conference as the more productive.

"It was the first time I ever saw a live Russian scientist," Doctor Seaborg remarked. "I'm in favor of more conferences."

One of the big problems in converting uranium to electrical energy, he said, is what

to do with the "hot garbage."

No satisfactory solution has yet been found, in his opinion. He suggested that scientists go slow in dumping atomic waste at sea.

"At sea we lose control and it may turn up again," he said.

He pointed out that England's "quick approach to nuclear energy" also is being used by other countries running out of fossil fuels. Among them are Japan and the nations of Western Europe.

A major barrier still facing American and Russian scientists is "how to sustain the power at hundreds of millions of degrees," Doctor Seaborg said.

CANADIAN WARNING

Nickle, publisher of two Canadian oil periodicals and co-editor of a third, stated:

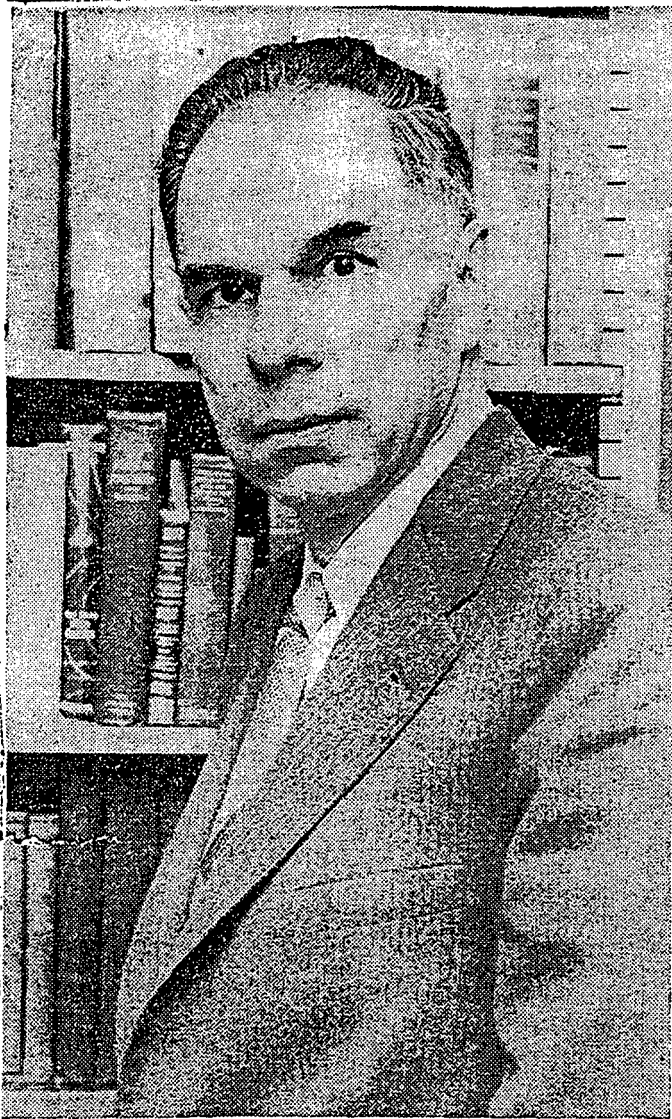
"Continued ignoring by the United States of the 'continental concept' in its oil import control plan could well lead to adoption by Canada, in self-defense, of nationalistic policies that over the long term would force less economic distribution of petroleum in North America and inhibit the ability of the neighbor nations to efficiently meet emergencies. . . ."

"From the United States oil industry's viewpoint, forcing of a Canadian 'national oil policy' would involve losing much of a market for refined products in Canada that, in value, balances the market for Canadian crude that would stem from a 'continental policy.' Inevitably also, American suppliers of oil industry goods to Canada would be adversely affected if Canada goes nationalistic."

Nickle concluded that a lack of co-operation could even lead to "lessened security."

McCobb, discussing the oil industry's overcapacity, said more American companies are getting into the foreign fields despite growing competition.

He said Russia has penetrated the free world petroleum market with offerings at prices which free competition cannot meet, and this may affect Soviet relations with Arab nations.



Dr. Glenn Seaborg, a Nobel prize winner, waited yesterday outside a regents' committee meeting on the University of California campus at Riverside and talked with a reporter.

NOBEL CHEMIST *Riverside Daily Enterprise*
2/26/59

More Humanities Research Urged

By TOM PATTERSON

Dr. Glenn Seaborg, Nobel prize chemist turned university administrator, said yesterday he still has a hand in science, but he is seeking to promote more than a science program.

He would like to see the social science and humanities fields get more support for research, and he favors more use of television "in the right spots."

DR. SEABORG succeeded Dr. Clerk Kerr as chancellor of the Berkeley campus of the University of California when Kerr became president. He is in Riverside for the regents' meeting.

His science background, he agreed, is helpful to an administrator, and his present job is an "interesting new challenge," but he also said:

"I'd like to see institutes on the campuses for the humanities and social sciences with budgets to make possible for the professors to take time for research in their fields as has been possible since the war in the sciences."

HE APPLAUDED the investment made in research by the Atomic Energy Commission, the Institute of Public Health, Office of Naval Research, National Science Foundation and numerous private foundations.

But as to the social sciences and humanities, "They don't really have these opportunities at all."

Another thing: Dr. Seaborg "would like to build up the public lectures on our campus — what we call the drama, lectures and music. (A committee of the same name and function operates on the Riverside campus.)"

THIS METHOD of giving scholarly information to the public is underdeveloped, and it's an important adjunct of an educational institution."

DR. SEABORG'S idea of a good spot for television is the current course being taught on a national television network by Dr. Harvey White, on leave from Dr. Seaborg's Berkeley campus.

It's primarily intended for high school teachers, to help upgrade their information and methods.

"I think this is the only way we could have met this urgent and critical question on the time scale that's necessary.

"MATHEMATICS, I think, will be the next subject presented in this way.

"I believe there's a great future in educational television. The Magnuson bill now before Congress isn't ideal, but the political complexities are such as to make it better than trying to shoot for one incorporating everything that might be desired."

Dr. Seaborg won the Nobel prize in 1951 as co-discoverer of plutonium, important nuclear fuel, and other trans-uranium elements. Since then he has discovered others to a total of nine trans-uranium elements.

HE SPENDS two afternoons weekly in the radiation laboratory on the Berkeley campus.

"While his new job is "challenging" he said he wouldn't be doing it if he couldn't also remain a scientist.

Seaborg Reports Liberal Arts Neglected in Rush to Science

By ED SALZMAN

BERKELEY, Feb. 21—University of California Chancellor Glenn T. Seaborg fears that vital non-technological educational needs are being neglected during America's rush to promote scientific learning.

The world famous chemist says that U.C., which received \$122,000,000 last year to conduct atomic research, has been unable to obtain relatively minute amounts for several important projects in the liberal arts.

In an interview on the anniversary of Seaborg's first half year as top administrative officer on the Berkeley campus, the Nobel Laureate revealed that he has found areas

in which the university needs improvement.

"But most of them cost money," he commented. "And funds for non-scientific programs have become exceedingly difficult to obtain."

VOICES CONCERN

Dr. Seaborg expressed concern because, unlike many other institutions, the University of California does not have a modern language laboratory with the latest electronic equipment.

The necessity of establishing a top-notch language program is obvious, he said, and electronic facilities are vital to proper teaching of linguistics.

"Secondly, we need more endowments for cultural events—drama, lectures and music," Dr. Seaborg stated. "We're doing pretty well, but we have an excellent opportunity to do a great deal more."

He called for more art exhibits, music concerts, operas and wider use of the U.C. Greek Theater. "The taxpayers can't be expected to pay for these activities," he said. "The funds must come from endowments."

SOCIAL RESEARCH

The chancellor, who is relishing his new contacts with leaders in all fields, has concluded that U.C. also should have "a large social science and humanities institute to conduct research with resources comparable to those of our radiation laboratory."



DR. GLENN T. SEABORG
Champions Liberal Arts

"I wish we could get funds to free some of our professors for research in fields such as economics and foreign relations," was his statement. "For example, the institute could supply advice and assistance to the underdeveloped nations of the world."

What would be operation of such an institute cost per year? "Perhaps \$1,000,000 or so," Dr. Seaborg estimated.

Turning to science, the chancellor expressed a desire for the university to "get into the space sciences and develop equipment for rockets."

SPACE PROJECTS

Seaborg doesn't expect the university to launch space ships, but he thinks U.C. should begin programs similar to those under way at Cal Tech and Iowa State.

Appointment to the chancellor post has caused several changes in Seaborg's routine. He has been forced to stop teaching advanced chemistry and remain available at all times for appointments, emergency meetings and conferences.

However, he still directs the activities of three graduate students in nuclear chemistry

and goes to the Radiation Laboratory two or three times a week to discharge his duties as associate director of the research plant.

One of the special jobs of the new position is Seaborg's weekly open conference hour with students. What do they ask?

"Anything," he replied. "A complaint that a course isn't taught right . . . A professor is flunking too many students . . . A youngster doesn't know what course to take . . . Questions about student politics . . . anything."

Seaborg finds relations with students so enjoyable that he had decided to keep his office in Dwinelle Hall, primarily a classroom building, instead of moving to the Berkeley campus administration building, Sproul Hall.

The chancellorship has had no effect on the family life of Dr. Seaborg or his five children. But Mrs. Seaborg has learned that there's a wide difference between being the wife of a teacher-researcher and being the wife of an administrator.

SOCIAL OBLIGATIONS

Whereas, Mrs. Helen Seaborg could stay home almost all the time last year, she's now obliged to attend teas, board meetings, planning groups, committees and other functions virtually every day.

Dr. Seaborg looks for more scientists to move into key administrative posts in government, education and industry. "The scientist is now a member of a team rather than a laboratory worker. He now has a far greater chance to demonstrate his administrative ability, but the Latin professor remains in the same position."

The chancellor will return to the classroom following a respite of almost a year on May 29, and he'll have the largest class of students in his career. On that date, Seaborg will lecture on his favorite topic, "The Transuranium Elements," on television's "Continental Classroom."

March 10, 1959

Dr. Seaborg Ceremony Set March 20

Dr. Glenn T. Seaborg, one of the world's foremost scientists, will be officially inaugurated as chancellor of the Berkeley campus during the University of California's ninety-first Charter Anniversary Exercises to be held Friday, March 20, in the Greek Theater.

President Clark Kerr, who was inaugurated as head of the statewide University late last September, will deliver the annual Presidential Charter Day message for the first time in his new role.

Dr. Seaborg, the Nobel Laureate, professor of chemistry who is also associate director of the Lawrence Radiation Laboratory, will deliver the inaugural address at the special Inauguration-Charter Day ceremonies. Earlier that week, Dr. Seaborg will also deliver the Annual Faculty Research Lecture on the subject, "The Man-Made Chemical Elements," at 8 p.m. Wednesday, March 18, in Wheeler Auditorium. The lecture is one of the traditional events held during Charter Week.

NOBEL AWARD

Chancellor Seaborg, who has just been named by President Eisenhower to the President's Science Advisory Committee, took over the post of chief administrative officer of the Berkeley campus last Aug. 15.

The internationally-renowned atomic scientist is noted for his research on the transuranium elements, for which he and Prof. Edwin M. McMillan received the Nobel Prize in Chemistry in 1951. Since 1940, he has been co-discoverer of all nine artificial elements between plutonium (element 94) and the recently discovered element 102.

UC PRODUCT

The scientist received all of his education at the University of California, taking his AB degree on the Los Angeles campus and his PhD at Berkeley. He is the only University alumnus who has been named "Alumnus of the Year" by the alumni associations of both the Los Angeles and the Berkeley campus.

Between 1942 and 1946, Seaborg served as director of plutonium research for the Manhattan Project at the University of Chicago Metallurgical Laboratory. One of his principal responsibilities there was the working out of the complete chemical process for the separation of plutonium.

Univ. of Cal. Release Thursday Afternoon, March 12)

Clip Sheet **Eisenhower Names**

Seaborg to Council

BERKELEY, March 12.—Chancellor Glenn T. Seaborg, Nobel Prize-winning leader of the University of California, Berkeley, has been named by President Eisenhower to the President's Science Advisory Committee.

The Committee, headed by Dr. James Killian, president of the Massachusetts Institute of Technology, is composed of a small group of leaders in American science who advise the President on policy in scientific and technical fields.

Dr. Seaborg is a co-discoverer of plutonium, element 94, fuel of atomic bombs and potentially of atomic energy. He is also co-discoverer of eight other synthetic elements heavier than plutonium, and of scores of radioactive isotopes.

The scientist has held a number of other advisory posts to the government. For example, as a youthful scientist, just after World War II, he was selected for the first roster of members of the General Advisory Committee of the Atomic Energy Commission.

1959

1

UN President Will Be Charter Day Speaker

Berk. Gazette 3/14/59

The inauguration of the Nobel chemist, Dr. Glenn T. Seaborg, as chancellor of the Berkeley campus will highlight the University of California's ninety-first Charter Day exercises at 2:30 p.m., Friday, March 20, in the Greek Theater.

President Clark Kerr, who was inaugurated as chancellor on a similar occasion six years ago, and as president of the

Statewide University last September, will make an introductory address and preside.

Dr. Seaborg, the internationally-famed atomic scientist who is also associate director of the Lawrence Radiation Laboratory, will give the inaugural address. The new chancellor, who assumed duties last Aug. 15, will also deliver the Annual Faculty Research Lecture—one of the traditional Charter Week events—at 8 p.m. Wednesday in Wheeler Auditorium on the topic "The Man-made Chemical Elements."

DR. MALIK

Dr. Charles Malik, president of the thirteenth regular session of the United Nations General Assembly, and former Lebanese ambassador to the United States, will be the guest speaker honoring the inauguration.

One of the special highlights of the Inauguration-Charter Day festivities will be the dedication of the new Strawberry Canyon Recreational Area, to be opened for the use of students, faculty and staff on March 21. The Haas Club-use has been made possible through the beneficence of Elise

and Walter Haas, while a large swimming pool has been named for Lucie Stern, Mrs. Haas' aunt from whose estate a gift of funds made this faculty possible. The dedication will immediately precede the afternoon ceremonies in the Greek Theater.

GREETINGS

Greetings in honor of Dr. Seaborg's inauguration will be extended by the following: Gov. Edmund G. Brown from the State; Donald H. McLaughlin, chairman, Regents; Mortimer Smith, president, California Alumni Assn.; William Stricklin, president, Associated Students; Frank Kidner, vice chairman, Academic Senate, Northern Section, and Norman Topping, president of the University of Southern California, who will represent California colleges and universities.

DELEGATES

Delegates from some 50 California colleges, universities, learned societies and other institutions will march in the impressive academic procession which will form at the Campanile Esplanade and march to the Greek Theater, preceded by the traditional procession of alumni classes.

The Charter Anniversary Banquet sponsored by the California Alumni Assn. will take place at 7 p.m. Friday in the Garden Court of the Sheraton-Palace Hotel, with Smith presiding. James B. Black, chairman of the Board, Pacific Gas and Electric Co., will receive the "Alumnus of the Year" award for 1958. Speakers for the occasion include President Kerr, Chancellor Seaborg and Dr. Malik.

Tickets will be distributed to the public without charge from 9 a.m. to 4:30 p.m. Thursday, March 19, at the south end of the basement of Sproul Hall on the Berkeley campus.

University Bulletin

A WEEKLY BULLETIN FOR THE STAFF OF THE UNIVERSITY OF CALIFORNIA

Volume 7, No. 30 March 16, 1959

Seaborg, Saunders, and Fleming to Be Inaugurated as University Celebrates Its 91st Charter Day

Glenn T. Seaborg will be inaugurated as Chancellor of the Berkeley campus and John B. deC. M. Saunders and Willard C. Fleming will be installed as Provost and Vice-Provost, respectively, of the San Francisco Medical Center during Charter Day ceremonies this month.

The University's 91st annual celebration of its founding will also feature faculty research lectures, invited speeches, and alumni activities on seven campuses, commencing March 15 and concluding March 25.

Guest speakers will include Charles A. Malik, President of the Thirteenth Session of the General Assembly of the United Nations, addressing both Berkeley and Los Angeles; Detlev W. Bronk, President of the National Academy of Sciences, at La Jolla; Samuel B. Gould, Chancellor-Elect of the Santa Barbara campus, at Riverside; and Aldous Huxley, Visiting Professor-at-Large, at Santa Barbara.

The schedule of ceremonies and activities follows.

Berkeley

Sunday, March 15—Memorial for Dr. William C. Donald, former University Physician and former Director of the Student Health Service, Berkeley, 3:00 p.m., Ernest V. Cowell Memorial Hospital.

Wednesday, March 18—Annual Faculty Research Lecture, 8:00 p.m., Auditorium, Benjamin Ide Wheeler Hall. President Clark Kerr, presiding. Lecturer: Glenn T. Seaborg, Chancellor at Berkeley, Professor of Chemistry, and Associate Director of the Ernest Orlando Lawrence Laboratory, Berkeley. Subject: "The Man-made Chemical Elements."

Friday, March 20—Luncheon to dedicate the Strawberry Canyon Recreational Area, 12:00 noon, Elise and Walter Haas Clubhouse. President Clark Kerr, presiding.

Charter Anniversary Ceremony and Inauguration of Glenn T. Seaborg as Chancellor at Berkeley, 2:30 p.m., Greek Theater. President Clark Kerr, presiding. Inaugural Address: Glenn T. Seaborg, Chancellor at Berkeley, Professor of Chemistry, and Associate Director of the Ernest Orlando Lawrence Laboratory, Berkeley. Guest Speaker: The Honorable Charles A. Malik, President, Thirteenth Session, General Assembly of the United Nations.

Charter Anniversary Banquet, sponsored by the University of California Alumni Association, 7:00 p.m., Garden Court, Sheraton-Palace Hotel, San Francisco. Mortimer Smith, President of the California Alumni Association, presiding. Invited Speakers: President Clark Kerr; Glenn T. Seaborg, Chancellor at Berkeley; James B. Black, Chairman of the Board, Pacific Gas and Electric, "Alumnus of the Year." There will be a reception in the

Rose Room immediately following the banquet.

Oakland Tribune

ESTABLISHED FEBRUARY 21, 1874

ASSOCIATED PRESS... WIREPHOTO... UNITED PRESS INTERNATIONAL... CHICAGO DA

OAKLAND, CALIFORNIA, TUESDAY, MARCH 17, 1959

Dr. Seaborg To Lecture at U.C. Faculty

BERKELEY, March 17—Chancellor Glenn T. Seaborg of the University of California will deliver the 46th annual U.C. Faculty Research Lecture at 8 p.m. tomorrow in Wheeler Auditorium.

Dr. Seaborg, an internationally known atomic chemist and winner of the Nobel prize, will speak on "The Man-made Chemical Elements."

The chancellor's work in the discovery of transuranium elements is considered a milestone in the history of science.

Dr. Seaborg was selected to deliver the lecture by a faculty committee headed by Dr. E. B. Emeneau, professor of general linguistics and sanskrit.

Research Lecture by Seaborg

The Nobel Laureate chemist, Dr. Glenn T. Seaborg, Chancellor of the University of California, Berkeley, and associate director of the Lawrence Radiation Laboratory, will deliver the forty-sixth annual Faculty Research Lecture at 8 p.m. tomorrow evening in Wheeler auditorium on the Berkeley campus.

The internationally-renowned atomic scientist will speak on the topic, "The Man-made Chemical Elements." Dr. Seaborg's work, together with his co-workers, in the discovery of the transuranium elements, including the discovery of plutonium (element 94) and each new succeeding element through element 102, is regarded as a milestone in the progress of science.

The lecture tomorrow evening precedes the University's ninety-first Charter Day Exercises at 2:30 p.m. Friday, in the Greek Theater, at which time Dr. Seaborg will be inaugurated as Chancellor of the Berkeley campus, delivering the inaugural address.

The Faculty Research Lecture-ship is bestowed annually upon an individual whose researches have outstanding merit. Chancellor Seaborg was selected last October by a faculty committee headed by Dr. M. B. Emeneau, professor of general linguistics and Sanskrit, and which included some of the most distinguished scientists on the Berkeley campus. The selection of the chief administrator of the Berkeley campus for this honor emphasizes Dr. Seaborg's dual role in the realms of administration and scientific research and also underscores his stated intention to continue to devote part of his energies to the latter.

OUTSTANDING

At the time of Chancellor Seaborg's selection, the committee cited such additional accomplishments as his discovery of scores of isotopes of stable elements; his leadership in pioneering the methodology and instrumentation of nuclear chemistry; and his influence in the training of most of the nation's nuclear chemists.

Chancellor Seaborg received his A.B. at the Los Angeles campus of the University and his Ph.D. in 1937 here at Berkeley. He has been on the Berkeley staff since his graduation, and received the Nobel Prize in Chemistry in 1951.

The public is cordially invited to attend Faculty Research Lecture tomorrow evening in Wheeler auditorium.

Tickets for Chancellor Seaborg's inauguration at Friday afternoon's Charter Day Exercises may be obtained without charge from 9 a.m. to 4:30 p.m. Thursday, at the south end of the basement of Sproul Hall on the Berkeley campus.

Daily Cal. 2/18/59

Chancellor Inauguration Planned

Glenn T. Seaborg will be officially inaugurated as Chancellor at the annual Charter Day exercises at 2:30 p.m. Friday.

Charles Malik, president of the 13th regular session of the United Nations General Assembly, and former Lebanese Ambassador to the United States, will be the guest speaker.

University President Clark Kerr will make an introductory address and preside over the ceremonies.

One of the special highlights of the Inauguration-Charter Day festivities will be the dedication of the new Strawberry Canyon Recreational area to be opened for the use of students, faculty and staff on Saturday.

Greetings in honor of Seaborg's inauguration will be extended by the following: Governor Edmund G. Brown; Donald McLaughlin, chairman of the Board of Regents; Mortimer Smith, president of the California Alumni Association; Bill Stricklin, ASUC president; Frank Kidner, vice-chairman of Academic Senate, Northern Section, and Nor-

man Topping, president of the University of Southern California.

Delegates from 50 California colleges, universities, learned societies and other institutions will march in the academic procession which will form at the Campanile Esplanade and march to the Greek Theater. It will be preceded by the traditional procession of alumni classes.

Tickets for the Charter Day exercises may be obtained without charge from 9 a.m. to 4:30 p.m. tomorrow at the south end of the basement of Sproul Hall.

The Charter Anniversary Banquet sponsored by the California Alumni Association will take place at 7 p.m. Friday in the Garden Court of the Sheraton-Palace Hotel. Mortimer Smith will preside. James Black, chairman of the Board of Pacific Gas and Electric Company will receive the Alumnus of the Year award for 1958.

Charter Day ceremonies will be held today at the University Medical Center in San Francisco. John Saunders will be inaugurated as the First Provost. He is also Dean of

the School of Medicine.

Willard C. Fleming, dean of the School of Dentistry, will be inaugurated as Vice-Provost.

President Clark Kerr will preside over the ceremonies and Saunders will give the Charter Day and Inaugural Address.

The faculty research lectures will be given by Karl Meyer, director, emeritus, of the George Williams Hooper Foundation for Medical Research. He will speak about immunization against plague.

Russ May Lead Us in New Field

Berk. Gazette 7/19/49

The possibility that the Russians may forge ahead of the United States in another field of basic scientific research—the discovery of new elements and the study of the structures of heavy nuclei—has been suggested today by Dr. Glenn T. Seaborg, chancellor of the Berkeley campus of the University of California and Nobel Laureate in chemistry.

The suggestion was made by Dr. Seaborg in the annual faculty research lecture, a traditional event of Charter Week, which will be climaxed by the scientist's official inauguration as chancellor in ceremonies in the Greek Theatre tomorrow.

Russian scientists have started construction of an ultra-high flux nuclear reactor, which is basic to the creation and discovery of very heavy elements above the heaviest now known, element 102, discovered here at Berkeley last year. Such a reactor has not as yet been authorized in this country, he said.

The object of an ultra-high flux reactor is to create an enormous number of neutrons in a small area. With such an extremely high neutron flux it will be possible to mimic, on a more modest scale, the conditions that occur in supernovae (exploding stars) and hydrogen bombs. In these two situations ordinary atomic nuclei capture many neutrons, are thus "fattened up," and become nuclei of heavier atoms. Elements 99 and 100 were discovered in the debris of the first thermonuclear explosion at Bikini, when, because of the high neutron flux of the explosion, single atoms of uranium were able to capture many neutrons.

In such an ultra-high flux reactor, it would be possible, through this same multiple capture process, to build up plutonium to element 98, californium. Milligram (a thousandth of a gram) quantities of californium could be produced,

which are large amounts in terms of such material. The californium could be bombarded in the HILAC, the big accelerator at Berkeley especially built for speeding up heavy particles. A heavy particle, when added to californium, would produce heavy elements ranging up to 104, 105 or higher.

MATERIAL SHORTAGE

One of the handicaps in present efforts to produce new elements is the shortage of target materials. Quantities of californium that can be made by present methods are barely at the visible level, and require years to produce.

An ultra-high flux, enriched uranium reactor in this country would cost about \$10,000,000, according to Dr. Seaborg, and would require more developmental research.

Dr. Seaborg said that the creation and study of heavier elements is important in yielding new insight into the structure of nuclei all through the heavy part of the periodic table.

The scientist also said that Russian researchers may also have created and identified an isotope of element 102, one different from that reported by Berkeley scientists last year. The Berkeley isotope is 254. The Russian isotope of element 102 appears to be 253, although identification is not yet certain.

All of the elements heavier than uranium, element 92, have so far been discovered in the United States. Berkeley scientists have discovered or shared in the discovery of all 10.

Daily Californian

MONARCH OF THE COLLEGE DAILIES

Vol. 170

Berkeley, California, Thursday, March 19, 1959

No. 32

Russians May Forge Ahead

Seaborg Gives Science Lecture

The Russians may forge ahead of the United States in another field of basic scientific research, the discovery of new elements and the study of the structures of heavy nuclei, Chancellor Glenn T. Seaborg said last night.

Seaborg, a Nobel laureate in chemistry, spoke at the annual faculty research lecture, a traditional event of Charter Week. He will be officially inaugurated in ceremonies at the Greek Theatre tomorrow.

Russian scientists have already started construction of an ultra-high flux nuclear reactor, which is basic to the creation and discovery of very heavy elements, Seaborg said.

ELEMENT 102

Such a reactor has not as yet been authorized in this country although the heaviest element now known, element 102, was discovered at Berkeley last year, Seaborg said.

The object of an ultra-high flux reactor is to create an enormous number of neutrons in a small area. With such an extremely high neutron flux it will be possible to mimic, on a more modest scale, the conditions that occur in *Supra Novae* (exploding stars) and hydrogen bombs, he said.

In these two situations ordinary atomic nuclei capture many neutrons and become nuclei of heavier atoms, having been "fattened up."

EXPLOSION

Because of the high neutron flux of the explosion, single atoms of uranium were able to capture many neutrons in the debris of the first thermonuclear explosion at Bikini, forming elements 99 and 100, Seaborg said.

This same multiple capture process in an ultra-flux reactor makes it possible to build up plutonium to element 98, californium. Milligram (a thousandth of a gram) quantities of californium could thus be produced. (Such quantities of this element would be large.)

NEW ELEMENTS

Present efforts to produce new heavy elements are hindered by a shortage of californium target material for bombardment in the atom accelerators to speed up heavy particles. A heavy particle, when added to californium, would produce heavy elements ranging up to 104, 105 or higher.

According to Seaborg, an ultra-high flux enriched uranium reactor would cost about \$10,000,000 in this country. Such a reactor would require more developmental research and would generate about 100,000 kilowatts of energy.

ENERGY GENERATED

This energy would be generated in about one cubic foot of space and up to 5 million billion neutrons per second per square centimeter would exist.

The creation and study of heavier elements is important in yielding new insight into the structure of nuclei all through the heavy part of the periodic table, Seaborg said.

The scientist also said that Russian researchers may have created and identified an isotope of element 102, one different from that reported by Berkeley scientists last year. The Berkeley isotope is 254. The Russian isotope of element 102 appears to be 253, although identification is not yet certain, Seaborg said.

All of the elements heavier than uranium, element 92, have so far been discovered in the United States. Berkeley scientists have discovered or shared in the discovery of all 10.

SEABORG FEARS RUSS GAIN IN SEARCH FOR ELEMENTS

BERKELEY, March 19—Dr. Glenn T. Seaborg, chancellor of the University of California, fears that the Soviets may soon forge ahead of the United States in the discovery of new elements.

The Nobel Laureate in chemistry issued the warning during the annual Faculty Research Lecture, a traditional Charter Week event.

Seaborg, who will be inaugurated as chancellor tomorrow, reported that the Russians have started construction of an ultra-high-flux nuclear reactor, which is needed to discover elements above the heaviest now known.

Such a reactor has not yet been authorized in this country, he said, and would cost about \$10,000,000.

U.C. Charter Day Rites Tomorrow

BERKELEY, March 19—The University of California will celebrate its 91st anniversary tomorrow with a colorful and event-packed program highlighted by the inauguration of Dr. Glenn T. Seaborg as Berkeley chancellor.

The feature event of the day, joint Charter Day and inauguration exercises, will begin at 2:30 p.m. in the Greek Theater.

Dr. Seaborg, 46, one of the world's leading nuclear chemists, will speak on "Learning in the World of Change" following investiture as chief campus administrator, a post he assumed on Aug. 15.

Another major address on "The University in an Age of Crisis" will be delivered by Dr. Charles Malik, president of the United Nations General Assembly and former Leba-

nese ambassador to the United States, who will be guest of honor at the inauguration.

Honorary doctor of laws degrees will be conferred upon two outstanding U.C. professors emeriti. The Regents have authorized the high honor for Albert I. Elkus, professor of music, and Edward C. Tolman, professor of psychology.

Selection of Tolman by the Regents came as a surprise because the famous psychologist clashed bitterly with the university's governors a few years ago while he was fighting against the loyalty oath.

Thirteen members of the state legislature are scheduled to attend the Charter Day festivities. They will join delegates from some 50 California universities and other institutions in the traditional impres-

sive academic procession from the base of the Campanile to the Greek Theater.

A procession of alumni will march before the delegates, who will be led by University Marshal Frank L. Kidner, professor of economics. A special senior 100-man Guard of Honor will bring up the rear.

Expected to participate are State Senators James A. Cobby, Nathan F. Coombs, John Holmdahl, Albert S. Rodda and W. Jack Slattery, and Assemblyman Bruce F. Allen, Robert W. Crown, Lloyd W. Lowrey, Thomas J. McBride, Don Mulford, Nicholas Petris, Jerome Waldie and Gordon H. Winton Jr.

President Clark Kerr, who was inaugurated as Chancellor during Charter Day exercises six years ago, will preside over

the ceremonies.

Greetings will be extended to Dr. Seaborg by Gov. Edmund G. Brown, for the State; Dr. Donald H. McLaughlin, chairman of the Regents; Mortimer Smith, president of the California Alumni Association; Norman Topping, president of the University of Southern California; William Stricklin, president of the Associated Students, and Kidner, vice-chairman of the Academic Senate.

Prior to the Greek Theater program, President Kerr will dedicate the university's new \$400,000 Strawberry Canyon Recreational Center at an informal noon luncheon.

The California Alumni Association's annual Charter Anniversary Banquet will be held at 7 p.m. in the Sheraton-Palace Hotel, San Francisco.

James B. Black, board chairman of the Pacific Gas and Electric Company, will receive the "Alumnus of the Year" award for 1958 at the banquet. President Kerr, Dr. Malik and Chancellor Seaborg will speak.

Berkeley Daily Gazette

EVENING, MARCH 19, 1959

Gala Charter Day At UC Tomorrow

Crowds to See Inauguration Of Seaborg

The University of California will celebrate the ninety-first anniversary of its founding tomorrow with one of the most colorful and event-filled Charter Day programs of recent years, highlighted by the inauguration of one of the world's leading atomic scientists as chancellor of the Berkeley campus.

The main events of the day—the joint Charter Day and inauguration ceremonies—will commence at 2:30 p.m. in the recently-renovated Greek Theater on the Berkeley campus.

Nobel Prize chemist Glenn T. Seaborg, associate director of the Lawrence Radiation Laboratory, will be invested as chief campus administrator, a post he assumed last Aug. 15. The man he succeeded, President Clark Kerr, was also inaugurated as chancellor on a similar occasion six years ago, and as president of the Statewide University last September. Dr. Kerr will give an introductory address and preside over the ceremonies.

Dr. Charles Malik, president of the thirteenth regular session of the United Nations General Assembly, and former Lebanese ambassador to the United States, will be guest speaker honoring the inauguration.

13 LEGISLATORS

The occasion will be further dignified by the presence of 13 California State legislators attending one or more of the various functions taking place throughout the day. The following are scheduled to be present:

Assemblymen—Bruce F. Allen, 29th District; Robert W. Crown, 14th District; Lloyd W. Lowrey, 3rd District; Thomas J. MacBride, 8th District; Don Mulford, 18th District; Nicholas Petris, 15th District; Jerome R. Waldie, 10th District; Gordon H. Winton Jr., 31st District.

Senators—James A. Cobey, 24th District; Nathan F. Coombs, 11th District; John Holmdahl, 16th District; Albert S. Rodda, 19th District; W. Jack Slattery, 4th District.

In addition, delegates from some 50 California colleges, universities and other institutions will march in the impressive academic procession from the base of the Campanile to the Greek Theater, led by Frank W. Kidner, professor of economics and university marshal, and preceded by the traditional alumni class procession. A special guard of honor composed of some 100 senior men will bring up the rear.

GREETINGS

During the ceremonies, greetings will be extended by Gov. Edmund G. Brown from the State; Donald H. McLaughlin, chairman, the Regents of the University; Mortimer Smith, president, California Alumni Assn.; William Stricklin, president, Associated Students; Frank Kidner, vice chairman, Academic Senate, northern section; and Norman Topping, president of the Univer-

sity of Southern California, who will represent California colleges and universities.

A highlight of the afternoon program is the conferring of honorary doctor of laws degrees by President Kerr on two distinguished professors emeritus who achieved international recognition in their respective fields; Albert I. Elkus, professor of music, and Edward C. Tolman, professor of psychology.

Prior to the Greek Theater ceremonies tomorrow afternoon, President Kerr will dedicate the University's new Strawberry Canyon Recreational Area which will open on Saturday for the use of students, faculty, staff and their families. The informal noon dedication will be held in the Haas Clubhouse, named after Elise and Walter Haas of San Francisco, whose gift of \$295,000, together with a sum from the estate of the late Lucie Stern, aunt of Mrs.

Haas, have made the project possible.

ANNUAL BANQUET

Following the Charter Day-Inauguration program, the annual Charter Anniversary Banquet sponsored by the California Alumni Assn. will be held at 7 p.m. in the Garden Court of the Sheraton-Palace Hotel, San Francisco, Mortimer Smith, presiding. James B. Black, chairman of the board, Pacific Gas and Electric Co., will receive the "Alumnus of the Year" award for 1958. Speakers include President Kerr, Chancellor Seaborg, Dr. Malik and Black.

Tickets for the Charter Day-Inauguration are available without charge in the south end of the basement of Sproul Hall on the Berkeley campus.

March 19, 1959

UN Chief Urges World Peace at UC Charter Day

By GERALD BEATTY

The University of California celebrated its ninety-first anniversary today with a bow to past and a prayer for future accomplishments.

The University awarded honorary degrees to two retired professors, invested Dr. Glenn T. Seaborg with the chancellor's robes of office, and heard a plea for peace from Dr. Charles Malik, president of the United Nations General Assembly.

The annual Charter Day exercises were conducted under the panoply of tradition in the Greek Theater before an audience of 10,000 that overflowed

**MORE CHARTER DAY
NEWS ON PAGE 13**

the hard white concrete benches to the lawn above the theater.

An unseasonably warm sun shone on the faces of the audience, while on the stage of the theater, shadows blended with the black gowns of the faculty.

TWO BY TWO

As is customary, the faculty, led by President Clark Kerr, formed at the base of the Campanile and marched up the hill to the theater. The UC Concert Band played spirited marches as the faculty entered two by two in a seemingly unending line.

In the forefront with President Kerr were Emeritus Professors Albert Elkus, former head of the music department, and Edward Tolman, noted psychologist, who received honorary degrees.

Also in the presidential party were Dr. Malik and Dr. Seaborg, who added the duties of chancellor to his scientific research which already has earned him a Nobel Prize.

Since it was his day, so to speak, Dr. Seaborg delivered his first major address as chancellor.

Noting that we live in an age of evolution, where each day

March 20, 1959

-SEABORG INAUGURATED



CHANCELLOR GLENN T. SEABORG will be inaugurated this afternoon as a part of the annual Charter Day ceremonies, to be held from 2 to 4 p.m. in the Greek Theatre.

The celebration of the 91st anniversary of the University's chartering will take place today with one of the most colorful Charter Day programs of recent years, highlighted by the official inauguration of Glenn T. Seaborg as Chancellor.

The joint Charter Day Inauguration ceremonies will begin at 2:30 p.m. in the Greek Theatre. Classes from 2-4 p.m. will be suspended.

Seaborg took over the post of chief Berkeley administrative officer last August 15. An internationally-renowned atomic scientist, he is noted for his research on the transuranium elements, for which he and Edwin M. McMillan, director of the Lawrence Radiation Laboratory, received the Nobel Prize in chemistry in 1951.

Since 1940, Seaborg has been co-discoverer of all nine artificial elements between plutonium (element 94) and the recently discovered element 102.

Seaborg received his A.B. degree at UCLA, but acquired his Ph.D. at Berkeley. He is the only University alumnus who has been named "Alumnus of the Year" by Alumni Associations of both the Los Angeles and Berkeley campuses.

During today's ceremonies, greetings from the state of California will be extended by Governor Edmund G. Brown. Other representative speakers will include Donald H. McLaughlin, Chairman of the Regents; Mortimer Smith, president of the California Alumni Association; ASUC President Bill Stricklin; Frank Kidner, Vice-chairman of

the Northern Section of the Academic Senate; and USC President Norman Topping.

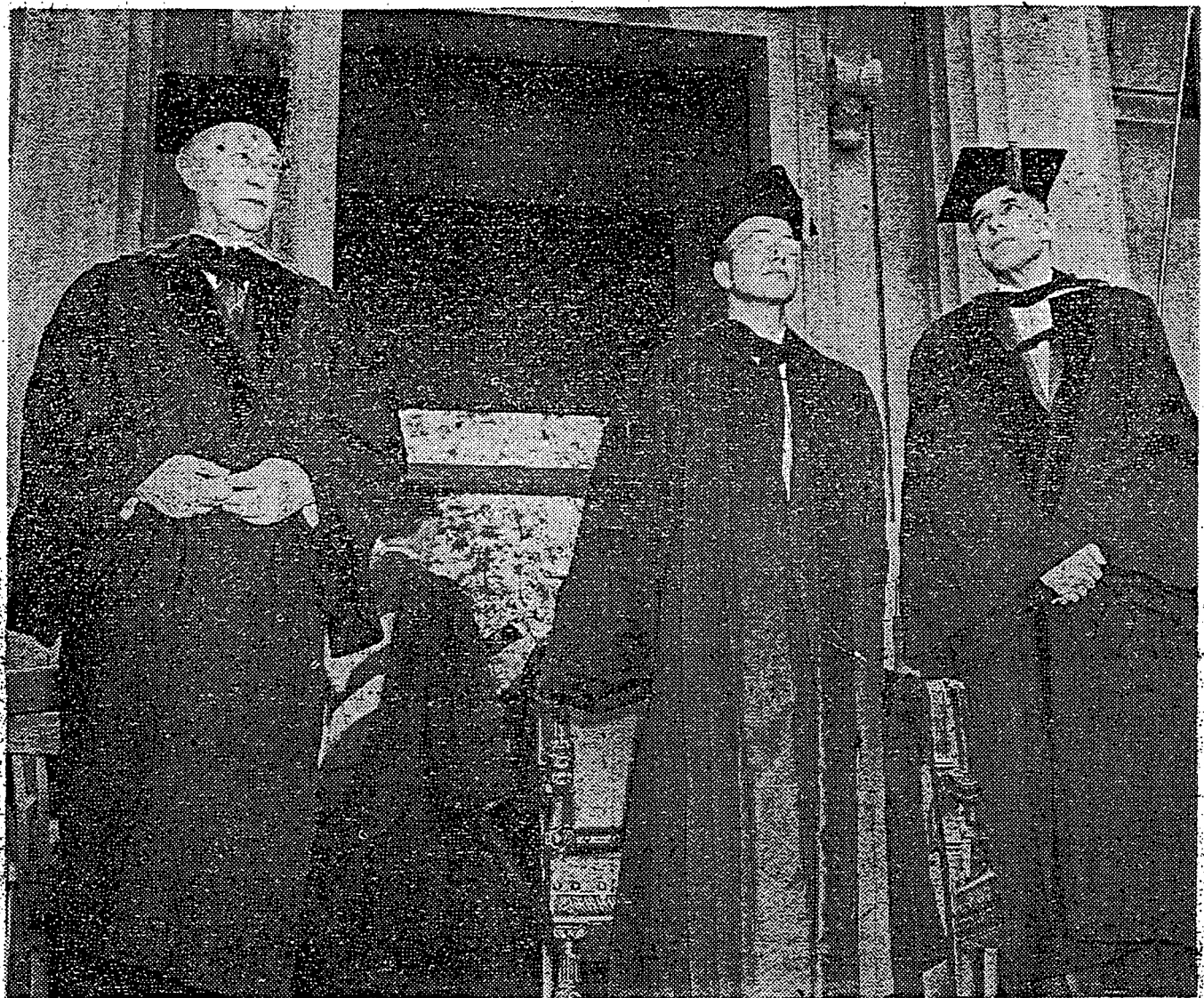
Delegates from 50 California colleges, universities, and other institutions will march in the impressive academic procession from Campanile Esplanade to the Greek Theatre, led by Frank L. Kidner, professor of economics and University Marshal. They will be preceded by the traditional alumni class procession and followed by a special guard of honor composed of 100 senior men.

Clark Kerr, who served as Berkeley chancellor until he was inaugurated as President of the University last September, will deliver the annual Presidential Charter Day message.

Seaborg, Nobel Laureate professor of chemistry and associate director of the Lawrence Radiation Laboratory, will deliver his inaugural address during the afternoon exercises.

The program will include the conferring of honorary doctor of laws degrees by President Kerr on two distinguished professors emeriti who achieved international recognition in their respective fields: Albert I. Elkus, professor of music, and Edward C. Tolman, professor of psychology.

The Charter Anniversary Banquet, sponsored by the California Alumni Association, will take place at 7 p.m. today in the Garden Court of San Francisco's Sheraton-Palace Hotel, with Mortimer Smith presiding. James B. Black, chairman of the board of the Pacific Gas and Electric Company, will receive the "Alumnus of the Year" award for 1958. Kerr, Seaborg and Charles Malik, the Charter Day guest speaker, will be among the speakers.



Facing capacity crowd of more than 10,000 during Charter Day ceremony in Greek Theater of University of California, are, left to right, West German Chancellor Konrad Adenauer, UC President

Clark Kerr, and UC Chancellor Glenn T. Seaborg. (More Charter Day pictures on page 9.)

Berkeley Daily Gazette
5/22/68
Gazette photo

Chancellor Sees 'War of Classroom'

Seaborg Warns of Race With Russia

At U.C. Inauguration

Oakland Trib. 3/20/59

BERKELEY, March 20—Dr.

Glenn T. Seaborg today pleaded with the free world to prepare for the decisive "classroom war" with communism at his inauguration as University of California Chancellor.

In addition to the investiture of Dr. Seaborg, highlights of the colorful and eventful 91st Charter Day Exercises in the university's Greek Theater this afternoon included:

1—Announcement by U.C. President Clark Kerr that Southern California oil magnate Edwin W. Pauley, former chairman of the Regents, has donated \$1,000,000 toward the student center now under construction on the Berkeley campus.

PROFESSORS HONORED

2—Receipt of honorary doctor of laws degrees by two famous professors, Albert I. Elkus and Edward C. Tolman.

3—Emphasis on the responsibilities of the university in an "Age of Crisis" in an address by Dr. Charles Malik, president of the United Nations General Assembly.

Dr. Seaborg, 46, the second Berkeley chancellor in U.C. history, stated that the final East-West war, "which mercifully does not include nuclear weapons," has already begun. The Nobel Laureate in chemistry predicted that the "blood, sweat and tears will be shed in the classrooms, libraries and laboratories" and that the war will end gradually "and perhaps without the defeated knowing it for a long time."

VITAL QUESTION

How can America prepare for battle?

Seaborg outlined a program stressing acceleration of the upward movement of the educational level, stimulation to the fullest of gifted young people, development of the conviction that education is a life-long job and broadening the content of education to equip the intellect for the "World of Change."

He called for correction of "an underemphasis on science that can be fatal. Until our people become as much at home with science as with other phases of our national life, I fear that we shall have increasing difficulty living up to the ideal of an informed people as the proprietors of liberal democracy."

WORD OF CAUTION

But the new chancellor, who took over as chief campus administrator from President Clark Kerr on Aug. 15, cautioned against an overemphasis on science.

"Just as our university now has funds to provide scientists with periods of freedom to create, so should we be able to afford the same opportunity to scholars in the arts, humanities and social sciences," he declared.

The traditional, impressive procession from the Campanile to the theater was led by Joseph Layman, class of 1888, a retired medical librarian from Oakland.

ALUMNI PARADE

The alumni parade was followed by delegates from other universities and institutions and members of the U.C. faculty—all garbed in the academic robes denoting their fields of study.

Once inside the amphitheater, built into a Berkeley hillside, President Kerr pointed out that he was especially pleased to preside at this year's anniversary ceremony so that he could repay Dr. Seaborg "for a similar service he performed at my inauguration as President last Sept. 29."

Greetings were also extended to the new chancellor by Gov. Edmund G. Brown, Regents Chairman Donald H. McLaughlin, Alumni Association President Mortimer Smith, Associated Students President William Stricklin, Academic Senate Vice-Chairman Frank L. Kidner and Norman Topping, president of the University of Southern California.

GUEST OF HONOR

Guest of honor at the exercises was Dr. Malik, former Lebanese ambassador to the United States.

Dr. Malik stated that science, which helped bring on the danger of a devastating war, must help save the world.

He said that science must be developed in our universities, which must remain as "temples of truth," dealing primarily with the realization that "our common humanity" is above all distinctions in nation, race, culture or class.

Dr. Malik blasted the "myth of peaceful co-existence" with communism. Peace with communism cannot be obtained until the ideology overcomes itself, the United Nations leader pointed out.

He urged that the free world bring out "in all love and understanding" the great literature, scientific and spiritual achievements of the Russian people.

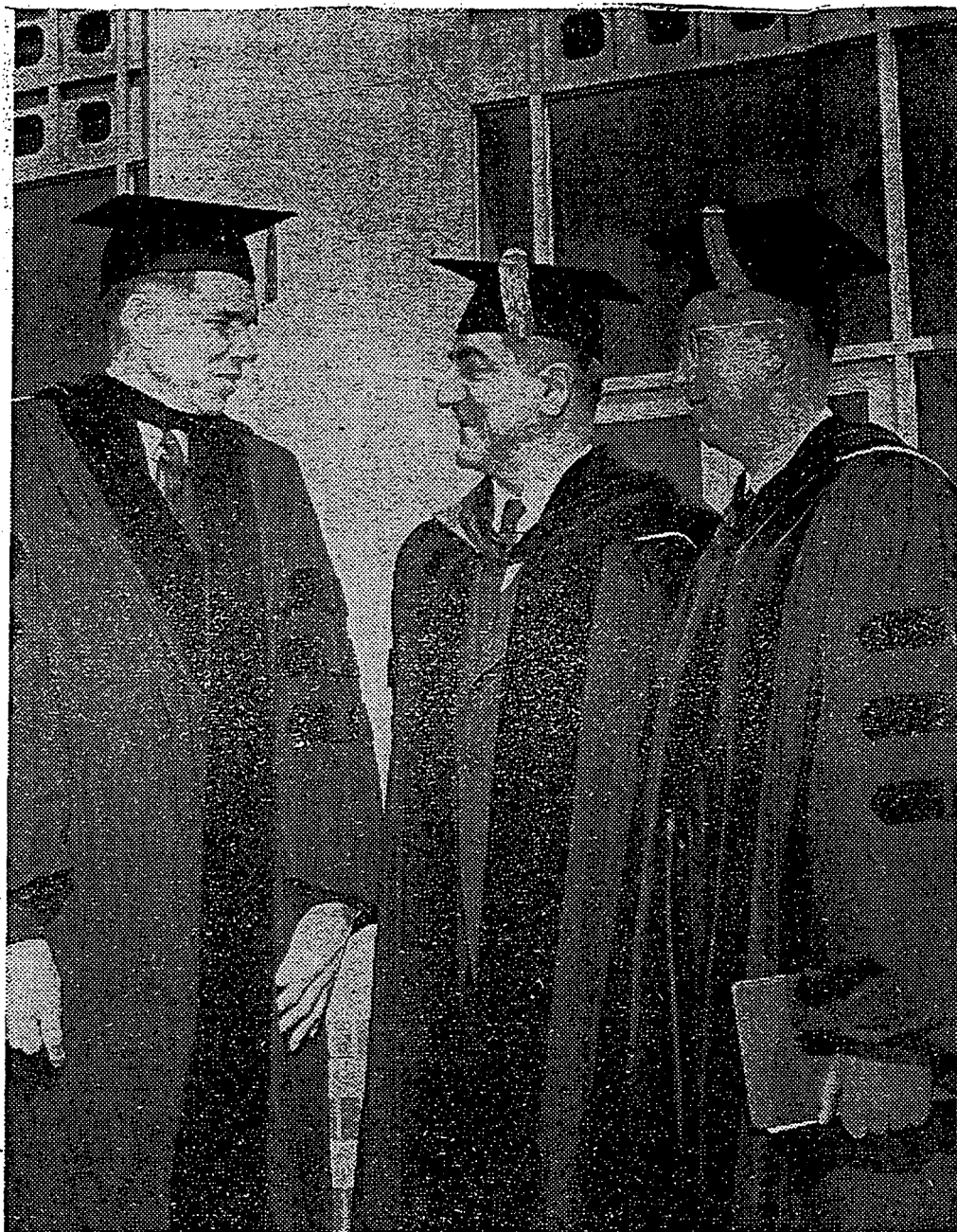
OTHER CULTURES

Universities have a responsibility to establish research institutes in the language and cultures of Asia and Africa, he added.

Prior to the Greek Theater ceremonies, President Kerr dedicated the university's new \$400,000 Strawberry Canyon Recreation Area at an informal luncheon.

The California Alumni Association will honor its "Alumnus of the Year" tonight at the annual Charter Anniversary banquet in the Sheraton-Palace Hotel.

The honor will be given to James B. Black, board chairman of the Pacific Gas and Electric company.



PARTICIPANTS—Taking part in U.C. Charter Day events were (from left) Chancellor Glenn T. Seaborg; Dr. Charles Malik, U.N. Assembly president, and Dr. Clark Kerr, president of the university. Seaborg was officially inaugurated at the ceremonies.

Chancellor Sees 'War of Classroom'

Seaborg Warns of Race With Russia At U.C. Inauguration

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Key Daily Gazette

UC Celebrates at 91st Charter Day Rites

Chancellor's Robes Accorded Seaborg

UN Chief Voices Plea for Peace; Teachers Feted

By GERALD BEATTY

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TWO BY TWO

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In the forefront with President Kerr were Emeritus Professors Albert Elkus, former head of the music department, and Edward Tolman, noted psychologist, who received honorary degrees.

Also in the presidential party were Dr. Malik and Dr. Seaborg, who added the duties of chancellor to his scientific research which already earned him a Nobel Prize.

Since it was his day, so to speak, Dr. Seaborg delivered his first major address as chancellor.

Noting that we live in an age of evolution, where each day seems to bring new changes, he called for an educational system keeping pace and keeping the peace.

THREAT OF WAR

"The world is engaged in a contest, perhaps the final contest of civilization, in which the major alternatives are the ideologies of the Western liberal democracy and communism. And there is a threat of war.

"Yet, despite occasional episodes to the contrary, the awareness seems to be growing that war today is a more irrational method than ever of settling international disputes," he said.

Dr. Seaborg suggested that the longer we can delay violence, the keener will be that awareness and the greater the chance for reason prevailing.

He warned that even with peace "We must look to a decisive conflict."

The new war, to his way of thinking, will be one of "blood, sweat and tears" in the classrooms, libraries and laboratories.

"The war has already begun—silently," Seaborg said. "It came at a time when we were distracted with our material pleasures and indifferent to the need for constant nourishment of our liberties.

"The war will end gradually, without any signal. And the defeated may not even know that he has lost," the scientist said.

"For in the hearts and practices of the uncommitted peoples will be the seeds of humanism or authoritarianism, implanted by the ideological and intellectual performances of one side or the other."

MAJOR FACTORS

For successful adaption to the world of change, he listed five factors that hold the key: time, complexity, values, education and research.

"Time is our least abundant commodity and we must make our democratic judgments more quickly and surely than ever before," he said.

"While we must act more quickly, the matters on which we must act grow increasingly more complex.

"Once persuaded, I believe we will re-examine some of our values. Can we afford the present emphasis on leisure and material goods? We have gone far towards our ideals of a material paradise, but are we preserving our ideals?" he asked.

He urged the more careful utilization of our educational system and noted that of the top 25 per cent of high school graduates only one-half go on to college. He touched on the failure of brighter college graduates to go into research and the lost talent among women and minority groups.

Research into educational techniques to get more information into people and to sharpen their critical sense, was urged by the chancellor.

Dr. Seaborg demanded more balance of knowledge, including more science, but not at the expense of the humanities.

Daily Cal. 3/20/59

Chancellor Seaborg's Life Includes Science, Athletics

By JANIE SEMPLE

From a boy whose dream was to become an All-American football end has come one of the great scientific minds in the world today.

Glenn T. Seaborg, who will be inaugurated as Chancellor of the University today, was too light for football, so he was told. His first thought of becoming a scientist came in his junior year in high school.

Winner of the Nobel Prize in chemistry in 1951, Seaborg displays it on the same shelf with his Big C golf tournament cup. Admitting he had a handicap, he won the cup by one stroke.

SEABORG'S CHILDHOOD

Seaborg was born in the mining town of Ishpeming, Michigan. According to John Voelker of Ishpeming Seaborg was a quiet boy and shared the usual childhood sicknesses with his "non-nuclear" schoolmates.

Voelker wonders if there were some strange chemistry in the hills of Ishpeming that attracted the future nuclear chemist. He tells this story of Seaborg's early childhood:

When Seaborg was two years old, he learned to count his age, which was a very proud achievement. Shortly after this he was taken to visit an uncle's farm.

COW-COUNTING

The uncle owned three cows, and Seaborg followed them about the fields. When he returned home a neighbor asked him how many cows he had seen. Seaborg frowned and grew thoughtful. The problem and its abstractions appeared to be insoluble.

At length he piped up, "I thaw two cows . . . and there was one more."

Seaborg earned his own spending money in high school by taking paper routes and mowing lawns. When he graduated from high school he went to work in a warehouse as a stevedore. Three weeks later he secured a job as night laboratory assistant in the Firestone Tire and Rubber Company.

He entered UCLA in 1929 and was forced to earn his way through school. In the summer of 1930 he earned money by picking apricots in the San Joaquin Valley. Later in the summer he became an apprentice to a linetype machinist for the Los Angeles Herald, keeping the machines cleaned and oiled.

UNIVERSITY CAREER

In 1939 he became an instructor at the University of California and in 1941 was promoted to assistant professor. Skipping the rank of associate professor, he was promoted to full professor in 1945.

Seaborg's fame rises from his discoveries, with associates, of such previously unknown elements as Plutonium, Americum, Curium, Berkeleium, Californium, Einsteinium, Fermium and Mendeleevium.

One of his more important contributions to science was his recognition that the heavy elements form a transition series of "actinide" elements in a manner analogous to the rare earth series of "lanthanide" elements.

Seaborg's publications now stand at about 160. He is currently writing two books in collaboration with his colleagues, "A Short History of Actinide Elements" and "Nuclear Properties of the Heaviest Elements."

EISENHOWER APPOINTMENT

He was recently appointed to President Eisenhower's Scientific Advisory Committee.

In spite of his time-consuming scientific activities, Seaborg has long been an ardent sports fan. For years he was seen in the locker rooms after basketball games. The players thought he was an alumnus.

His chief hobby is golf, which he finds relaxing, and he shoots in the 90's. Football is his favorite spectator sport. Since 1953 he has served as faculty athletic representative of the University.

The Seaborgs have five children and live in Lafayette, next door to I. Perlman, professor of chemistry at the University.

Seaborg is presently trying to decide if he likes his job as Chancellor. The position lasts for an indefinite length of time, or as Seaborg puts it, "during good behavior."

He said as Chancellor he is mainly interested in preserving a balance at the University. Although he is fully aware of the need for more scientists, he feels that the humanities must also have their place.

Seaborg is still continuing his scientific research and balances his time between that and his administrative duties.

Berkeley Daily Gazette

BERKELEY, CALIFORNIA, SATURDAY EVENING, MARCH 21, 1959

Publication Office 2048
Second Class Postage

Education Called Key To Survival

S.F. Chronicle 3/21/59

Two dynamic figures in this world of change—a diplomat of international stature and a Nobel laureate in chemistry—agreed yesterday that the final battle between democracy and Communism will be fought in the classroom.

Both of them, Dr. Glenn T. Seaborg, the University of California's new Chancellor, and Dr. Charles Malik, president of the 13th General Assembly of the United Nations, warned, in essence, that a decisive conflict between East and West is yet to come.

But the critical weapons, they said, will be brainpower and the "infinite glories of science and spirituality."

The two men were participating in the University of California's Charter Day exercises, held in the Greek Theater to commemorate the 91st anniversary of the university's founding. The ceremonies marked Seaborg's formal inauguration as Chancellor.

WAR'S MENACE

Seaborg told an audience of 5000 that, given peace, the peoples of the world must still look toward a de-

cisive conflict—"a contest of ideas and of intellectual achievement and performance in which the 'blood, sweat and tears' will be shed in classrooms, libraries and laboratories."

The realities of the non-military trials ahead, he said, require the fullest development of individual talents, increased research, and increased and better balanced educational facilities.

'WEST'S ADVANTAGE'

Malik, former Lebanese envoy to the United States, said that if the West has any decisive superiority over the Communist world it lies in the "wonderful recent revival of liberal education."

In the West's great free universities, he said it is "nonsense" to set up a competition between liberal edu-

cation and scientific culture.

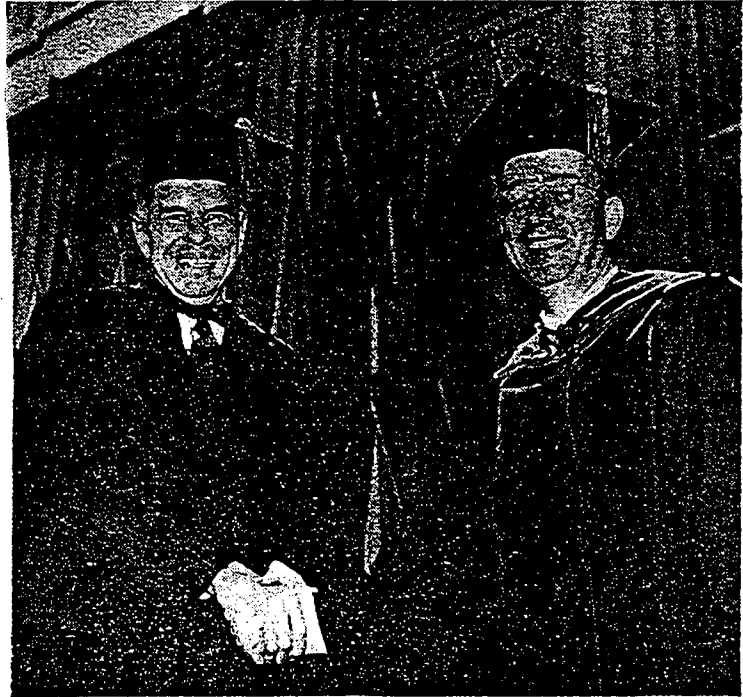
"If the West has any decisive superiority," Malik said, "it consists in the intensive cultivation of theory whereby the mind penetrates, understands and exploits nature."

ROLE OF SCIENCE

The answer to the danger of war, he said, is more science and still more science.

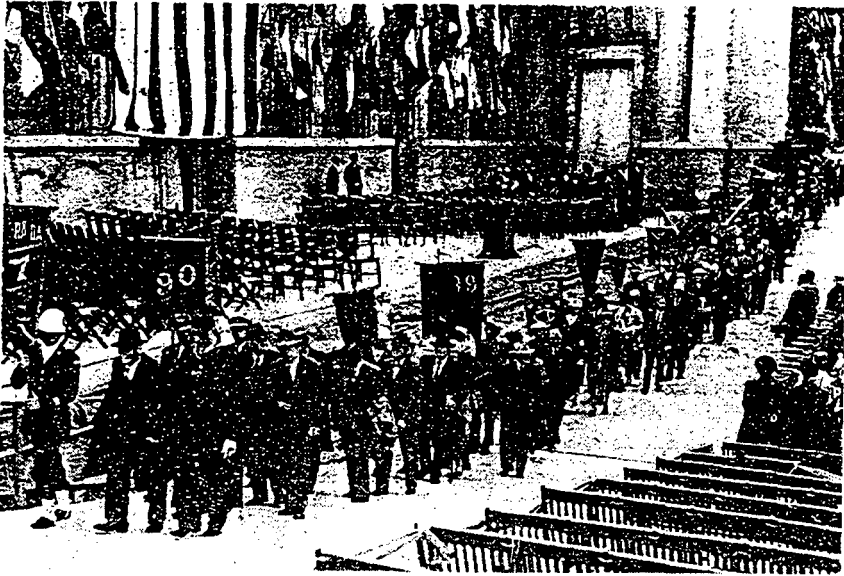
"It was science that helped to create this material civilization with its infinite dangers," he said, "and it is science that must help to save it unto its infinite possible glories."

He warned that there will be no true peace with Communism until Communism radically modifies its character, overcomes itself and allows the Russian people free expression of their literary,



Dr. Glenn T. Seaborg, left, receives a mighty handclasp from University of California President Clark Kerr, after Seaborg was officially installed as chancellor of the local campus. The ceremonies were part of the ninety-first UC Charter Day exercises.

Greek Theatre Hosts Charter Day



POMP AND CIRCUMSTANCE such as that pictured above will be much in evidence today as the academic procession marches from the Campanile plaza to the Greek Theatre.

scientific and spiritual genius.

And similarly, he said, it is the immediate task of the Western university to lend a hand to the emerging peoples of Asia and Africa through the "law of nature and liberal and scientific education."

PAULEY GIFT

President Clark Kerr, making his first public address since his own inauguration last fall, formally announced yesterday that Regent Edwin W. Pauley, Los Angeles oil man, has made a gift of \$1 million to the university.

Kerr reviewed the activities and importance of the university to the State and said much had depended upon private donations. He particularly cited gifts that made possible the development of Strawberry Canyon Recreational Area, dedicated earlier in the day, notably from Walter A. Haas and the Haas family.

STUDENT CENTER

The UC president said that to date about \$2,375,000 has been raised for the California Student Center. Pauley's gift was for this project, as was a \$500,000 gift from former Regent Edward H. Heller, San Francisco financier.

A third large gift, Kerr said, has come from Mr. and Mrs. Charles Lee Tilden Jr., of Oakland, in memory of their son, Charles Lee Tilden III, a former UC student.



Tribune photo

CHANCELLOR'S FAMILY—Dr. Glenn T. Seaborg, new University of California chancellor, is shown in his Lafayette home with his wife, Helen, and their five children (from left), Peter, David, Lynne, Eric and Stephen. He is a noted chemist.

Chancellor Seaborg Forsook Grid Dream for Science Fame

By ED SALZMAN

BERKELEY, March 21—Although University of California Chancellor Glenn T. Seaborg is one of the world's most honored men, he never came even close to achieving his foremost ambition—selection as an All-American football player.

Dr. Seaborg has won the Nobel Prize in chemistry. Yesterday he was inaugurated as administrative chief of the Berkeley campus, one of the nation's top educational posts.

As a youngster, however, neither of these great scientific and educational laurels

would have impressed Seaborg in the least. He desired only to become a great end rivaling Don Hutson in gridiron history.

Probably the greatest disappointment in Seaborg's life was the realization that he wasn't heavy enough to make the varsity football team in high school.

NEW ENTHUSIASM

With the "dream of my life" an impossibility, Seaborg decided to become excited about science at the urging of a teacher in David Starr Jordan High School in South Gate.

Even while concentrating on chemistry and other academic

pursuits, Seaborg worked hard at sandlot football, hoping that perhaps he would become heavy enough to play in college.

Playmates recall that young Glenn was always captain of his team and "loved intricate plays" with laterals and reverses — and almost always winding up with a pass to end Seaborg.

While studying and working to become a leader in the field of nuclear chemistry, Dr. Seaborg never lost interest in athletics. That more than anything else probably prepared him for the job as chancellor.

ARDENT SPORT FAN

When Seaborg became a member of the U.C. faculty, he was a constant visitor to locker rooms of the Cal teams.

U.C. athletes — as well as other students — began to bring their problems to him. They found that Seaborg has a fantastic memory, both for names and the worries of each student.

Although Seaborg was appointed chancellor in the post-Sputnik science age, he is certain that he would have been chosen if he had been a Latin professor.

His concern for student welfare is so strong that he refused to move his office to Sproul Hall, the Berkeley campus administration building, from Dwinelle Hall because the old spot was "closer to the students."

RARE OCCURRENCE

Only one other scientist in American history, of Seaborg's stature, has ever become head of a major educational institution with varied curriculum. That was in 1945, when Nobel prize winner Arthur H. Compton was appointed president of Washington University in St. Louis.

While conducting research at the U.C. radiation laboratory and teaching chemistry, Seaborg participated in many non-scientific endeavors.

He has served on committees studying educational television, teacher training and studio recording facilities. He worked hard on a campaign to establish a new Alumni House on the Berkeley campus.

But Seaborg was best known in non-technological circles as Faculty Athletic Representative, a job which put him in the spotlight as the Pacific Coast Conference was demolished.

In 1942, Seaborg was married to Helen L. Griggs, who was secretary to the late famed Dr. Ernest O. Lawrence, director of the Radiation Lab. The Seaborgs have five children, Peter, 12; Lynne, 11; David, 9; Stephen, 7, and John Eric, 4.

The Seaborgs, who live in Lafayette, turned down an opportunity to move into the former president's house on the Berkeley campus.

They preferred to remain in the wide open spaces of Lafayette. The Seaborgs' house is on a large lot at 1154 Glen Road and they have acquired an adjoining acre for use as an athletic field.

SOVIET AT WORK ON NEW REACTOR

Ultra-High Flux Device May
Help in Discovery of New
Elements, Seaborg Says

Special to The New York Times.

BERKELEY, Calif., March 21 —Soviet scientists may forge ahead of the United States in the discovery of new elements and the study of the structures of heavy nuclei, Dr. Glenn T. Seaborg, Nobel Laureate, said here this week.

The statement was made in the annual Faculty Research Lecture, a traditional event of the university's Charter Week, during which Dr. Seaborg was inaugurated as chancellor of the Berkeley campus of the University of California.

Soviet scientists have started construction of an ultra-high flux nuclear reactor, which is basic to the creation and discovery of elements above the

heaviest now known—element 102, discovered at Berkeley last year. Such a reactor has not yet been authorized in this country, Dr. Seaborg said.

Large Number of Neutrons

The ultra-high flux reactor is designed to create an enormous number of neutrons in a small area. With an extremely high neutron flux it will be possible to recreate, on a more modest scale, the conditions that occur in super novae (exploding stars) and hydrogen bombs. In these two situations ordinary atomic nuclei capture many neutrons, are thus "fattened up" and become nuclei of heavier atoms.

Elements 99 and 100, for example, were discovered in the debris of the first thermonuclear explosion at Bikini.

In an ultra-high flux reactor it would be possible, through the multiple-capture process, to build up plutonium to element 98, californium. Milligram (a thousandth of a gram) quantities of californium could be produced. In terms of such material milligrams are large amounts.

The californium could be bombarded in the big accelerator at Berkeley, especially built for speeding up heavy particles. A

heavy particle, when added to californium, would produce heavy elements ranging up to 104, 105 or higher.

An ultra-high flux, enriched uranium reactor in this country would cost about \$10,000,000, according to Dr. Seaborg, and would require more developmental research. It would generate about 100,000 kilowatts of energy, which is on the order of the power from the huge Shippingport commercial power reactor.

Smaller Reactor Core

This energy would be generated in about one cubic foot of space, however, whereas the core of the Shippingport reactor is much larger. In this small core there would be up to five million billion neutrons a second a square centimeter.

Dr. Seaborg said that the creation and study of heavier elements is important in yielding new insight into the structure of nuclei all through the heavy part of the periodic table.

Dr. Seaborg also said that Soviet researchers may also have created and identified an isotope of element 102, one dif-

ferent from that reported by Berkeley scientists last year. The Berkeley isotope has an atomic weight of 254. The Soviet isotope of element 102 appears to have a weight of 253, although identification is not yet certain.

All of the elements heavier than uranium, element 92, have so far been discovered in the United States. Berkeley scientists have discovered or shared in the discovery of all ten.

March 22, 1959

OVERHEARD

Cal Foes Often Have 'Off' Night

By Art Rosenbaum

Dr. Glenn Seaborg, new chancellor at University of California, was discussing basketball earlier in the week. The Bears had just beaten Utah and St. Mary's, and were about to leave for Louisville where astonishing wins over Cincinnati and West Virginia awaited.

"As a spectator, I have great faith in our basketball team," said the chancellor.



DR. GLENN SEABORG

"I notice that very often, after we have won a game, the post-game report claims the other team has had an off night in its shooting. I believe there is a reason for this—the California team.

"I do not know whether we will win or lose against Cincinnati," continued the UC administrative chief, "but I am inclined to make one prediction. Cincinnati will also be held to its lowest point total of the season."

Dr. Seaborg was wrong. In the last four seconds of that throbber, Bob Dalton fouled Oscar (Big O) Robertson, and Robertson sank both free throws for Cincinnati's 58th point. Cal already had 66.

The lowest previous total for the Bearcats was 57, against St. Louis U.

So, as they say in Lower Mason street circles, sue him for a one point difference.

The Daily Californian

MONARCH OF THE COLLEGE DAILIES

Vol. 170

No. 34

Berkeley, California, Monday, March 23, 1959



CHARTER DAY: Left to right — Glenn T. Seaborg, Clark Kerr, Charles Malik, Albert Elkus, David Boyden. photo by Rasmussen-Jinnett)

Seaborg Inaugurated At Charter Exercises

By JANIE SEMPLE

Glenn T. Seaborg, in his inaugural address Friday, said the world is now engaged in a contest "in which the major alternatives are the ideologies of Western liberal democracy and communism."

Seaborg was inaugurated as the second Chancellor of the Berkeley campus Friday in the Greek Theatre.

He named five factors that would contribute to an adaptation to our "world of change:" time, complexity, values, education, and research.

"We are assailed on all sides by evidence of the failure of individuals to develop their talents fully," he said.

"We must extend our efforts to rescue lost talent, among women

and among minority groups. We must do more research in the development of new educational techniques, not only to get more information into people but to sharpen the individual's critical sense."

In emphasizing a need for science, Seaborg said that science should be added to the curriculum, but that the humanities should not be cut out.



Tribune photo

THE BIG TROPHY—Dr. Glenn Seaborg (center), recently installed University of California chancellor, smiles broadly as he points to figures on Cal's NCAA championship trophy. Flanking Seaborg are captain Al Buch (left) and coach Pete Newell.

Newell's Appraisal Of Bears Indicates Solid Club in '60

One never fails to get the full implication of the idea the California basketball squad is a "team" when listening to Coach Pete Newell describe his national champions.

This was apparent at a civic luncheon in Berkeley again yesterday when he was called upon to introduce those who had helped produce this first California history.

Starting at the end of the table, and taking them as they came with no thought to position, class, regular or reserve, player, trainer or manager, Newell said of each in this order:

Bob Dalton, senior forward: "If I've got the courage to put this guy on Oscar Robertson (Cincinnati's all-American) I'm courageous enough to do anything. He himself says that under a microscope he looks like a plucked chicken."

Jack Grout, senior forward: "The key play, if any, on Friday was his quick mental size up of a jump ball situation. Oscar controlled the tip, but he took the ball and went in for a layup. Oscar didn't get over it for five minutes."

Bernie Simpson, senior guard: "This is a smart kid. He should have graduated but saw something coming this year. He is still thanking Jerry Mann for the cracked shoulder that kept him out last year."

Jerry Mann, junior guard: "You will see a lot of him next year. He has a mental problem: He brushes his teeth on the bus and is the only player who carries a handkerchief in his uniform. I thought of putting him in against Oscar and let him pull that handkerchief routine. It's quite shaking to see him dribble with one hand and pull out that handkerchief with the other."

Tandy Gillis, junior forward: "He is a great bridge partner. (Gillis and Newell recaptured the team bridge title on the return flight from Chicago, defeating Dick Doughty and Denny Fitzpatrick.) He's a cinch to make the team. Also, he has the greatest last 30-second baseline shot in the business."

Wally Torkells, junior forward: "He comes off our Blues squad, and you who are acquainted with our Blues program know its contributions to our team. This is one of them." (The Blues are the Cal junior varsity.)

Jim Langley, senior forward: "This is a real fine boy to coach. You don't get two words out of him a season. He is a fine team player. He is the kind of boy who deserves the credit any team member should get."

Stan Morrison, sophomore center: "This fellow came down with mononucleosis early in the season and lost about six weeks of work and couldn't catch up. He will help a lot next year and will make a real valuable contribution to the team the next two years."

Dick Doughty, junior center: "He's one of the finest bridge players and a master of repartee. Words fail me. I'm sure they never saw that shot of his back in Louisville. He has a shot for every occasion. Always seems to do better than anyone anticipates except himself. Even disagrees with me about the starting lineups. He came here unheralded but has improved as much as any man on the club. He and Darrall (Imhoff) have made each other better."

George Hill, senior manager: "I never thought he would make it back. United Air Lines flies over Louisville at 8,000 feet and he was up at least 12,000. A good manager is very important to a team's success. He is a good manager."

Earl Shultz, sophomore guard: "He played enough to gain the confidence to be a fine performer the next two years. He is going to make his presence felt."

Jack Williamson, trainer: "I don't know what we would do without him. He just does everything. Always there. You don't need to worry about the little or big things, he will have them taken care of."

Ned Averbuck, sophomore forward: "He's co-captain of the extra five who came along with us. A real fine lad to have on the club. Has a sense of humor and the ability to give everything he has to the team."

Bobby Wendell, sophomore guard: "The other co-captain with Ned. We found the NCAA trophy is an inch and a half taller than he is. He and four of his mates beat the team that won this thing four nights in a row. He got us down to realization and made it possible for me to point out some little things that were happening. He and the other four worked hard right down to the end of the final practice."

Bill McClintock, sophomore forward: "We call him Magnet. The ball seems to fall into his hands around the basket. He's very effective. It's difficult for a new man, particularly a junior college transfer, to move in. He must make new friends, adjust to a new style. I don't think anyone could fit in any better."

Denny Fitzpatrick, senior guard: "He performed some wonderful shooting and is one of our most improved players defensively on the team. He and Al (Buch) keep us at an even level of performance."

Darrall Imhoff, junior center: "This is another lad who in high school didn't have the success needed to give him confidence. But he had the competitive ability that made him improve. You have to give Bob McKeen (former Cal center) a lot of credit. Next year he will be a fine center. The amount of improvement he has made is the greatest I have ever seen. He has been able to keep a fine sense of balance when suddenly shoved into the spotlight. He takes criticism well; he accepts it and also accepts driving."

Al Buch, senior guard: "He is a real leader. We have been very fortunate at the university. Our seniors have taken the challenge that all seniors have, denying themselves things that seniors on other teams don't. As captain, he has been designated the leader of the leaders. He and the others have passed this desire on to the sophomores and juniors. I am sure they will have it again next year."

Cal's Team Play Hailed

'Inspiring Triumph'

By BOB BRACHMAN

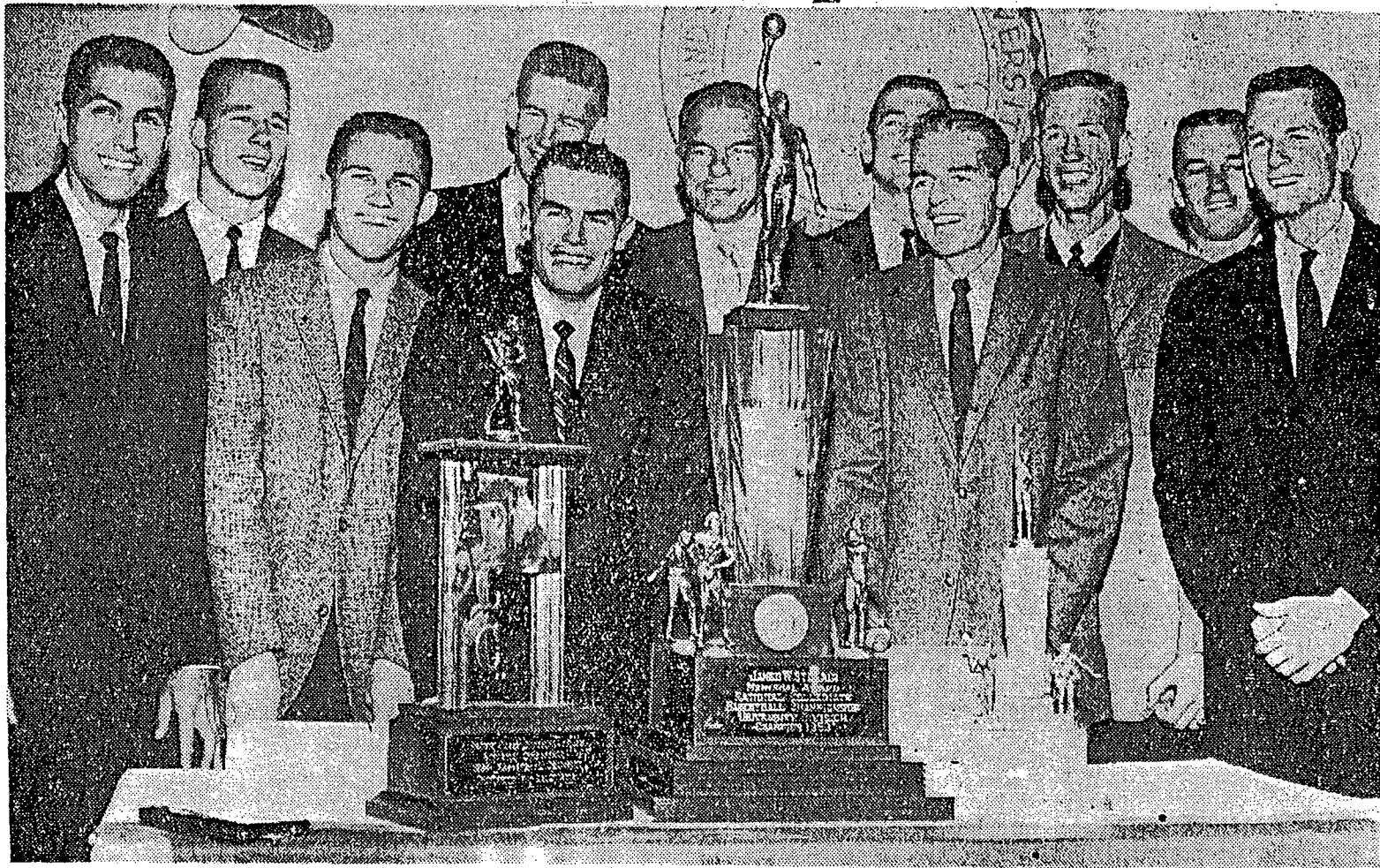
The inspiration of "a well coached, co-ordinated squad of men rather than a star with an all-male chorus behind him," was the theme of a huge Berkeley civic reception for California's national cage champions yesterday.

The prevailing sentiment echoed and re-echoed in the big banquet hall at the Shattuck Hotel, where Coach Pete Newell and the Bears were the honored guests of 10 booster and civic organizations.

It was President Clark Kerr who provided the motif in a letter explaining his absence because of Charter Day in Los Angeles and hailing the Bears for adding a great deal to the University's 91st year.

TYPICAL STUDENTS

Chancellor Glenn Seaborg said he was so proud because "the team is so representative of the student body and the ideals of the school."



IT'S GREAT TO BE A WINNER. HAPPY GOLDEN BEARS SURROUND CHAMPIONSHIP TROPHIES AT RECEPTION . . . (L to R) Buch, McClintock, Fitzpatrick, Imhoff, Simpson, Chancellor Glenn Seaborg, Doughty, Newell, Grout, Langley, Dalton

"It should be obvious that this is not a semi professional or professional club," declared the chancellor, with plain reference to the fact that Cal cagers receive no remuneration or inducements whatever, as happens at a number of schools which go in heavily for basketball.

Newell later facetiously referred to the chancellor's comments when he said, "If there were any doubt that we were amateurs we proved it in the last five minutes of the West Virginia game."

HIGHEST SATISFACTION

"The boys proved that the single individual is not the dominant factor," the deeply moved Newell continued. "I imagine that if we concentrated on any one of these boys here his scoring would be greater and so would his personal claim to fame.

"But they wouldn't have gotten that greatest satisfaction of all that goes with being a part of a team. The essence of college athletics is sacrifice and this team exemplifies that in its purest form."

He said the Bears would long be able to reflect on their part in a national championship, would be a little better fitted to move on into society and have a better sense of values where the big point makers would be forgotten.

Captain Al Buch's voice almost cracked when he expressed the deep respect of the players for their coach.

"Only one man deserves the credit. He's just great. I just can't say enough about Pete," Buch told a capacity audience of more than 360 persons.

TOWEL FOR PETE

Answering a question as to what Newell had told the Bears during a time out when Cal was trailing, 23-13, early in the championship game, Buch related:

"He told us we were taking our shots too quickly. We just went out and did what the head man said. It worked—not by a heck of a lot—but it worked."

March 24, 1959



That master bridge player, Dick Doughty, left, who flashed some fancy hands on the court at key times throughout the 25-4 season, deftly accepts his tie clasp and congratulations from the mayor of Berkeley, Claude Hutchison.



As were all 16 players present, plus the coaches, trainer, and manager, Earl Shultz, fine soph. guard prospect, is the recipient of a wallet from Chancellor Glenn Seaborg, the renowned scientist who's evidently discovered the winning sports formula.

Honoring Continues— UC Gym Rally for Bears Tomorrow

There's precious little opportunity for California's all-conquering basketballers to settle down to studying for mid-terms as the merry whirl of feting continues.

Yesterday it was the municipal luncheon for the Bears at the Hotel Shattuck.

Tonight it's the UC Hoop Club, comprised of former Cal cage stars headed by Bob Dable, toasting their season-opening three-point conquerors at the Bow and Bell. In turn, the players have some surprise gifts to present.

Tomorrow at 11 a.m. a University meeting, somewhat similar to that which feted the Rose Bowl gridders, will be conducted by Chancellor Glenn Seaborg, with more awards to be made during the hour at Harmon Gym.

Obviously, the 17 varsity squad members who won their last 16 games for a season record of 26 wins and four losses (including the unofficial Alumni opener), aren't going to forget about their momentous NCAA championship accomplishments for a long time.



Though home from the wonderful, wearying weekend at Louisville less than 18 hours, Coach Pete Newell, disdaining the towel on the podium, was as sharp as ever with the quips, despite the bowed heads of the Mayor and Scout Rene Herrerias. —Bob Lynds photos

TIE PINS, WALLETS

Even trainer Jack Williamson and Manager George Hill were presented inscribed beautiful wallets and "C" tie clasps yesterday, as all members except Dave Stafford made the civic reception accorded by 11 local and University organizations.

Features of the festivities which packed the University Room were Coach Pete Newell's whimsical rundown on the personnel and the humor-packed speeches by Captain Al Buch and Chancellor Seaborg.

"Your improving," acknowledged Newell, "You've been practicing, Albert." Then mentor ignored the towel offered by the floor captain upon following to the podium Buch, who though even sleepier than usual, came through nobly under the pressure of two of his former speech professors being in the assemblage.

Here are two versions of what Coach Newell said to his California basketball team when it was behind 23-13 in the NCAA

championship game against West Virginia.

"I tried to get in a word, but they were talking so much, the time was over and they didn't hear me. Maybe it got through by telepathy."

"I couldn't say exactly," Captain Buch declared, "because I was sort of nervous. But in essence he said West Virginia was making us play their type of game. That we were taking quick shots, not playing our usual game. So we just went out and did what the head man said and it worked. Not by a heck of a lot, but it worked."

The Bears won 71-70.

CRAFTY GUARDS

Newell introduced each player and commented concerning guards Buch, Denny Fitzpatrick and Bernie Simpson:

"The one that's out of the game sits next to me on the bench, then tells me the other one's tired."

"I'm probably the only coach who learned about coaching while sitting on the bench," cracked Newell.

Pete was almost beside himself with flowery praise of Rene Herfirst overlooking his diminutive in-errias' super scouting after at valuable assistant, "The Bandit—if I lose him, I'm out of a job."

In brief, Newell's rundown on the personnel included:

Bob Dalton—If I have the courage to put him on Oscar (Robertson), I have the courage to do anything.

Jack Grout—A key play Friday was his quick size-up of a jump ball situation to control Oscar's tip.

Bernie Simpson—He should have graduated last year, but knew something was coming; he's still thanking Jerry Mann for breaking his collar bone so he couldn't play last season.

Jerry Mann—It's quite a feat to dribble the ball with your right hand and blow your nose with the left.

Tandy Gillis—He has one of the best last-minute baseline jumpers, and he's a fine bridge partner.

Wally Torkells—He's one of our

Blues, and you know how much they contribute.

Jim Langley—He's the idol of the nop-mop slrig.

Stan Morrison—Has the ability to make an important contribution the next two years.

Dick Doughty—One of the finest bridge players. He has a shot for every occasion; I'm sure they'd never seen some of 'em in Louisville before. Always does better than anybody but himself thinks he will.

Earl Shultz — Has the ability and desire to be a big help next year with experience.

Ned Averbuck — Co-captain of the extra five; in charge of extracurricular activities.

Bob Wendell — Other captain of the extras; led them in beating the champions two nights in a row.

BERKELEY
LOS ANGELES
RIVERSIDE
LA JOLLA
DAVIS
SAN FRANCISCO
SANTA BARBARA
MT. HAMILTON

University Bulletin

A WEEKLY BULLETIN FOR THE STAFF OF THE UNIVERSITY OF CALIFORNIA

Volume 7, No. 32 April 6, 1959

The University of California's 91st Charter Day



SAUNDERS INAUGURATED—J. B. deC. M. Saunders, newly inaugurated Provost at San Francisco, exchanges congratulations with Dr. Karl F. Meyer, right, Faculty Research Lecturer, after Charter Day program in Millberry Union, San Francisco Medical Center. Between them is President Clark Kerr; at left, Vice-Provost Willard C. Fleming.



ALDOUS HUXLEY HONORED—The honorary degree of Doctor of Literature is bestowed on Aldous Huxley, Visiting Professor-at-Large at Santa Barbara, by President Kerr. Huxley's is the first honorary degree to be conferred on the Santa Barbara campus. A distinguished author and humanist, Huxley delivered the Charter Day address at Santa Barbara.

BERKELEY

East-West War Being Decided in Classrooms and Laboratories, Chancellor Seaborg Indicates

The final battle between democracy and communism will be fought in the classroom, Berkeley Charter Day speakers Glenn T. Seaborg and Charles A. Malik advised in featured addresses on March 20 in the Greek Theatre.

Seaborg emphasized that, even if given peace, the peoples of the world must still look toward a decisive conflict—"a contest of ideas and of intellectual achievement and performance in which the 'blood, sweat and tears' will be shed in classrooms, libraries and laboratories."

The final East-West war, he indicated, has already begun and will end gradually, "perhaps without the defeated knowing it for a long time."

The realities of the non-military trials ahead, Chancellor Seaborg said, require the fullest development of individual talents, a program of accelerated research, and more and better balanced educational facilities. He called for correction of an underemphasis on science, for "until our people become as much at home with science as with other phases of our national life. I fear that we shall have increasing difficulty living up to the ideal of an informed people as the proprietors of liberal democracy."

At the same time, the newly inaugurated Chancellor cautioned against an overemphasis on science. "Just as our University now has funds to provide scientists with periods of freedom to create, so should we be able to afford the same opportunity to scholars in the arts, humanities and social sciences," he declared.

Malik, President of the Thirteenth Assembly of the United Nations and former Lebanese Ambassador to the United States, stated that fundamental theoretical research is the creation of Western civilization and that Western civilization will perish "if the university is going to prove unworthy of this most marvellous creature of the West by seeking lesser things."

"If the West has any decisive superiority, it consists in the intensive cultivation of theory whereby the mind penetrates, understands and exploits nature," he declared.

The answer to the danger of war, he said, is science and still more science. "It was science that helped to create this material civilization with its infinite dangers, and therefore it is science that must help to save it unto its infinite possible glories."

Malik warned that there will be no true peace with communism until communism radically modifies its character, overcomes itself and allows the Russian people free expression of their literary, scientific and spiritual genius.

"An absolute distinction must be made between the Russian people and the Communist Party, partly because this

distinction is a fact, and partly because peace is going to depend more and more on the reaffirmation by the Russian people of their distinctive original spirituality."

The distinguished Middle Eastern diplomat and educator stated that the emergence of Asia and Africa into freedom and independence serves the university with exciting opportunities to help these peoples solve their own economic and political problems through science and learning, by discovering "the revolutionary importance of liberal and scientific education for them" and by letting "the English tongue fulfill its historic mission today."

President Kerr, in his first public address since his own inauguration last September, announced that a total of \$2,375,000 had been raised to date in the California Alumni Association campaign for the Student Center at Berkeley. Foremost among the donors is Regent Edwin W. Pauley, whose gift of \$1 million was announced publicly for the first time by the President. He also cited the new Strawberry Canyon Recreational Area at Berkeley, which was dedicated at a noon luncheon just prior to the afternoon ceremonies, the development of which was made possible by a gift from Walter and Elise Haas of San Francisco and the estate of Lucie Stern, late aunt of Mrs. Haas.

DAVIS

President-emeritus Sproul Derides "Crash Programs" for Solving Teacher Shortage

A "crippling shortage of teachers and professors" in the United States cannot be remedied by short-term "crash" programs, President-emeritus Robert Gordon Sproul told the Charter Day audience at Davis March 24.

He put in a plea for long-term planning, "an overhauling of our educational structure from bottom to top, both curricularly and financially."

"Primarily," he said, "the need is to speed up and improve the education of our best minds to their highest potential."

"The ultimate victory of representative democracy over totalitarianism and communism will not be ours unless our people truly accept this responsibility and demonstrate their willingness to sacrifice to fulfill it."

Addressing faculty members, students, and others of the University community at Davis, Sproul turned his attention largely to agriculture and to the future of the Davis campus "as a natural focus for farm people, farm interests and future farmers."

"I believe," he said, "that the social and economic problems of agriculture may well be far more difficult than its problems of technology and production."

"I say this because the present age of extreme specialization and increasing international contacts and impacts seems to me to underline and emphasize the need for broader education for careers in agriculture than has ever been needed or offered in the past. . . ."

"Each year of the twentieth century has seen farming in the United States become more specialized, more scientific, more competitive, and more expensive. The size of individual farms and farm operations constantly grows, whether measured in burgeoning acres or in shrinking dollars."

"Farmers more and more become involved, even integrated, with their suppliers and with those who process and distribute their products. The number of individual farm owners and operators steadily decreases."

"For these and many other reasons, not only the farmers on the land, the dirt farmers if you will, but also those men



HONORARY DEGREE—President Clark Kerr congratulates Charles A. Malik on receipt of his honorary degree to close Charter ceremonies on the Los Angeles campus. Acting Chancellor Vern O. Knudsen (right) adjusts Malik's newly bestowed hood.

and women engaged in related activities and especially what is sometimes called 'agribusiness,' will demand more and more general as well as special education, and only institutions of university stature will be able to give them what they need."

Sproul's Charter Day address highlighted ceremonies including a formal academic procession of the Davis faculty, representatives of the Regents, and statewide officers. The ceremony in Recreation Hall opened at 10:30, with Professor J. E. Knott, as University Marshal, leading the procession of robed faculty members.

Music was provided by the University Band and Chorus. Chancellor Stanley B. Freeborn presented the President-emeritus to the Charter Day audience after a report from Vice-president Harry R. Wellman. The Rev. Ray Dugger, pastor of the First Baptist Church of Davis, offered the invocation and benediction.

LA JOLLA

"We Need More Scientists Who Are Philosophers and Scholars"

The President of the National Academy of Sciences decried the trend of some universities to "give their students the bare bones of science, inarticulated and unclad with the flesh of meaning," in a Charter address at La Jolla on March 26.

Detlev W. Bronk warned that "scientists whose knowledge of science is narrowly restricted are hampered in their research. They are unfitted to form new facts into conceptual schemes—which is science." The universities in which these scientists serve often are guilty of the same type of error, presenting a wealth of knowledge in a single field of science but "no view at all of the broad sweep of intellectual adventure throughout the ages."

Bronk cited the plans for the establishment of an enlarged graduate curriculum at La Jolla and the program of the Rockefeller Institute, of which he is President, as being dedicated to the fulfillment of the ancient high ideals of a university.

Bronk called for the encouragement of the creative imagination, and for the fostering of more scholars who have "an understanding of the relatedness of the field of their competence to the many other fields of learning."

April 7, 1959

New Study Ordered on Health Bldg.

BERKELEY, April 7—The state has agreed to reopen studies for enlargement of its \$5,000,000 Public Health Building in downtown Berkeley, the city council was notified today.

City Mgr. John D. Phillips said he was so informed by the State Department of Finance. He said that the finance department will use funds for planning and site development to conduct a study in the controversy.

Phillips said that this is "a change of attitude" induce by Berkeley Assemblyman Don Mulford who has demanded a full investigation of the Public Health Department's plans on the building. The city attorney said that state study will cover enlargement of the building, or building a new one on level land, either at the Gill Nursery Tract, in Albany owned by the University of California, or at Sacramento.

MONEY PLEA LATER

"I am not so sure that the door is closed now, since the reevaluation has been ordered," Phillips said.

The information came in conversations with Dr. Malcolm Merrill, state director of health, Phillips said Merrill reported that no construction money will be asked until next legislature.

The council's liaison committee on university matters recommended that the building be enlarged "for the best interests of the people." The council adopted the recommendation and instructed the committee and Phillips to

"keep in close touch with the situation."

NO COMMITMENT

Chancellor Glenn Seaborg of the university has reported that the university has made no formal commitments on a proposal to swap Gill Nursery land on San Pablo Ave. for the building, the committee said.

In other business, the council:

Created an art commission of 11 members to serve four-year terms. The group will include a representative each from the Recreation and Planning Commissions and the Council.

Approved in principle the League of California Cities recommendation that any Metropolitan Council for the nine Bay Area counties recognize local government autonomy.

Entered an agreement with the university for a study of the replacement of the city's Sather Gate parking lot. The university will pay \$5,000 for the study and the city will spend \$3,500 for a study of long range parking needs in that area.

This is circulated to several thousand alumni of the University and to Omaha area business men and educators.

That you may know



UNIVERSITY OF CALIFORNIA

University of California

Chancellor Gives 'Telelecture'

Nobel prize winner Glenn Seaborg will present a "telelecture," the first of its kind in the nation, April 23 at the University of Omaha.

The Chancellor of the University of California at Berkeley and director of the radiation laboratory will speak on "Trans-uranium Elements" at 4 p.m. in the Eppley Conference Center. The hour-long illustrated lecture will be followed with a question-answer period.

The telephone lecture from the California radiation lab is the first in the nation to be sponsored by a student group, according to the American Chemical Society national office.

Omaha U's Student Affiliate of the American Chemical Society will be host to other University students, local high school science teachers and their outstanding students, faculty and students of the University of Nebraska and Creighton chemistry departments, and members of the Omaha Section of the American Chemical Society.



Dr. Seaborg received the Nobel Prize in Chemistry in 1951. Other honors include the Ericsson Gold Medal in 1948 and the Scott Award in 1953. He is co-discoverer of nine chemical elements.

Also Dana College, Midland College, and St. Mary's College.

Courses, Workshops During Summer

Five workshops and 154 general study courses will highlight OU's summer schedule in air-conditioned buildings.

A special three-week Intersession (May 18-June 5) will precede the regular five-week study periods. Primarily for county school teachers it will stress Educational Psychology, and Methods and Materials in Teaching Science.

The first five-week session is June 8

to July 11 offering 106 courses in 24 areas.

A new study area for summer students is the theater, acting and production, under the direction of Dr. Edwin Clark. Other workshops are — Gifted Child, Social Studies, Kindergarten Teachers, and College Business Management.

Second Session is July 13 to August 15 and evening session (Tuesday and Thursday), June 9 to July 30.

From the President's Desk

Education beyond high school is becoming more and more essential as the productive power of the nation increases. The development of automation, electronics, atomic power, jets, missiles, and other scientific areas demands highly trained technical specialists.

It is also just as essential that we have college trained specialists in the areas of social science, economics, history, and the humanities, as well as in the creative areas of art, music, drama and literature.

Never before has a college degree been a requirement for so many jobs. Youth is responding to this call by entering college in greater numbers than ever before. Fifty years ago only one youth in 24 continued his education after high school; today it's one in three; within 10 years it may be one in every two.

If your family includes a high school senior, no doubt the talk about college has already begun. Certainly, the time is ripe for planning his or her future, especially if it is to include college.

As your family seeks an answer to "which college or university" for John or Mary, we invite you to make use of the testing and counseling services at OU. We believe this service can be a very real help to you and your son or daughter as you seek to make an appropriate choice of a college or university.

We are proud of the faculty at OU for its many contributions to higher education, not the least of which is its competency in counseling the members of the student body. We hope you will avail yourself of this opportunity to

(Continued to Back Page)

April 9, 1959

'Telelecture' At OU Will Star Nobel Prize Winner

Nobel prize winner Glenn Seaborg will present a "telelecture," the first of its kind in the nation, April 23 at the University of Omaha.

The Chancellor of the University of California at Berkeley and director of the radiation laboratory, will speak on "Trans-uranium Elements" at 4 p. m. in the Gene Eppley Conference Center. The hour-long illustrated lecture by telephone will be followed by a question-answer period.

The telephone lecture from the California radiation lab is the first in the nation to be sponsored by a student group, according to the American Chemical Society national office.

Omaha University's Student Affiliate of the American Chemical Society will be host to other University students, local high school science teachers and their outstanding students, faculty and students from University of Nebraska and Creighton University chemistry departments, and members of the Omaha Section of the

American Chemical Society. Dr. Seaborg received the Nobel Prize in Chemistry in 1951. Other honors include the Ericsson Gold Medal in 1948 and the Scott Award and Medal in 1953. He is co-discoverer of nine chemical elements: Plutonium, 1940; Americium and Curium, 1944; Berkelium, 1949; Californium, 1950; Einsteinium, 1952; Fermium, 1953; Mendelevium, 1955 and Number 102, not yet named, 1958.

His research is mainly in the field of nuclear chemistry and physics.

University chemistry department faculty: Dr. Rodney J. O'Conner, assistant professor who received his doctorate in 1958 from the University of California at Berkeley; Dr. D. N. Marquardt, department chairman and past president of the Omaha Section of the American Chemical Society; Dr. Walter Linstromberg, current secretary of the society, and Paul Stageman, former secretary of the society and active in the Junior Academy of Science.

Dr. Seaborg Looks Ahead

(Dr. Glenn T. Seaborg, chancellor of the University of California and associate director of the University's Radiation Laboratory, is a world-respected expert in the field of nuclear power. In a talk recently in San Francisco, the Nobel prize-winning chemist made the following significant observations.)

"Let me say categorically that the United States is far out in front in over-all nuclear know-how, depth of industrial experience and numbers of trained nuclear technicians, scientists and engineers. This was true at Geneva in 1955 and 1958. The fact that the United Kingdom has built more large scale plants than we have, does not change that statement.

"We have not felt the same compelling reason to plunge headlong into nuclear power construction and our policy has been to carry out a broad scale development of all the basic reactor types and to develop deliberately a broadly based industrial experience in these types before we locked in our wide scale applications to a particular type which might not be the best one for the long pull.

"The greatest help to the underdeveloped nations in the nuclear area is coming not from nuclear power but from the applications of radiation and radioactive tracers isotopes to the problems of medicine, agriculture, prevention of food spoilage, the development of new plant species and a myriad of other small applications which together add up to a great deal.

"Probably the most difficult problem, which may well be the limiting factor in determining the extent to which nuclear energy will be used for industrial power, is that of disposal of the tremendous quantity of radioactive fission product waste material."

Britain, Japan and some Western European nations are building atomic power plants more swiftly and for immediate use—but they are using easier methods, "which are not necessarily best in the long run," Seaborg said.

For such countries, conventional power is so expensive that they must turn to atomics right now, and they are building reactors already obsolete, he feels. But America, Canada, West Germany and Soviet Russia can afford to work toward perfecting more efficient power reactors.

The ones now being built here and in Russia are better suited for industrial use, and can be more easily packaged for export to underdeveloped nations, Dr. Seaborg says.

"The United States has made more progress than the Soviet Union in nuclear power," he maintained. "But in the long run it won't be very meaningful. By the time both countries have developed substantial nuclear plants, neither will have any advantage."

Dr. Seaborg recently was named to the President's Science Advisory Committee by President Eisenhower. He is co-discoverer of plutonium, element 94, fuel of atomic bombs and potentially of atomic energy. He is also co-discoverer of eight other synthetic elements heavier than plutonium and of scores of radioactive isotopes.



DR. SEABORG

German Envoy To Tour U.C. Tomorrow

APRIL 22, 1959
BERKELEY, April 22—Wil-

helm Grewe, German ambassador to the United States, will visit the University of California tomorrow during a brief official tour of the Bay Area.

The U.C. schedule for the ambassador, who is Germany's foremost constitutional and international lawyer, will include a luncheon hosted by Chancellor and Mrs. Glenn T. Seaborg at International House, a conference with members of the political science faculty and an informal discussion with about 30 German students attending the university.

Grewe has taught law at the universities of Koenigsburg, Berlin, Goettingen and Freiburg.

He will arrive in the Bay Area late tonight by auto from Los Angeles and will leave Friday for Washington D.C. and Bonn.

Next Element Hard to Make

Won't Last the Time Needed to Identify

Dr. Glenn Seaborg, University of California chemist who is co-discoverer of nine elements heavier than uranium, said Thursday the business of making elements is becoming more difficult.

The chief problem, he said, is in identifying an element after it has been made. As the elements become heavier, their half-lives become shorter and it is harder to identify them before they decay.

At Long Distance

Dr. Seaborg spoke to an audience at the University of Omaha by way of a telephone hookup from his laboratory in Berkeley, Cal. As he spoke, slides were projected on a screen for the audience of more than two hundred in the University of Omaha Conference Center.

The lecture is probably the first to be delivered in such fashion across so great a distance, according to Dr. Rodney J. O'Connor, assistant professor in the Omaha University Department of Chemistry.

Has Nobel Prize

Dr. O'Connor is a graduate of the University of California and a friend of Dr. Seaborg.

Dr. Seaborg, holder of a Nobel Prize in chemistry, lectured on "The Trans-Plutonium Elements."

To continue the search for trans-plutonium elements, he declared, the United States must have a nuclear reactor with a higher neutron flux than is now available. There are indications the Russians are building one. It raises the possibility the Russians will overtake and surpass the United States in this field, he said.

The lecture was sponsored by the Omaha University student affiliate of the American Chemical Society. Attending were students and faculty members from Omaha and Creighton Universities and Omaha-area high school students.

UNIVERSITY BULLETIN

April 27, 1959

University Has Graduated Seven Nobel Laureates; Currently Has Total of Six on Its Faculty

The Board of Regents voted to forward to the State Legislature a report received at its April 17 meeting which revealed that seven of the 35 living American Nobel Laureates have earned degrees from the University of California.

The same report indicated that the University's seven Nobel prize winners represent nearly forty per cent of the entire number of Nobel winners graduated by American state universities.

Six of the Nobel Laureates are currently on the faculty of the University. They are, with the dates of their award: William Giaque, 1934; Edwin McMillan, 1951; John Northrop, 1946; Wendell Stanley, 1946; Glenn T. Seaborg, 1951; Harold Urey, 1934.

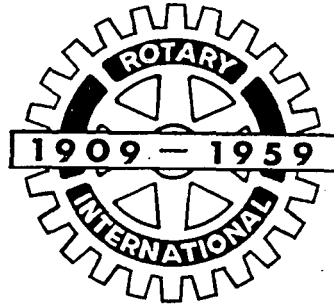
The Nobel Laureates whom the University has graduated are: Ralph Bunche, A.B., 1927; Joseph Erlanger, B.S., 1895; William Giaque, B.S., 1920; Ph.D., 1922; Willis Lamb, B.S., 1934; Ph.D., 1938; Glenn T. Seaborg, A.B., 1934; Ph.D., 1937; Harold Urey, Ph.D., 1933; Selman Waksman, Ph.D., 1918.

50TH ANNIVERSARY YEAR

1958 - 1959
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ROTARY CLUB OF OAKLAND No. 3

Vol. XLVIII, No. 47



The Live Oak



June 4, 1959

Program For This Week

GLENN T. SEABORG, Chancellor, UNIVERSITY OF CALIFORNIA

"THE NUCLEAR AGE"

Chairman: NORRIS NASH

THE NUCLEAR AGE

Dr. Glenn Seaborg is a native of Michigan, born of Swedish parents who moved to California when Glenn was quite young. He received his early schooling in Los Angeles County where, inspired by his teacher at David Starr Jordan High School, he found an early interest in chemistry and physics.

Young Seaborg was a typical independent and resourceful high school student with time from studies for paper routes and neighborhood gardening. After graduating from high school he began a series of jobs to put himself through college. These included time as a stevedore, fruit picker, and even cleaning and oiling linotype machines.

He graduated and received his Bachelor's degree from UCLA in 1934 and concluded that nuclear physics and chemistry was the field in which he would like to study further. He commenced graduate work at the Berkeley campus and received his Ph.D. in chemistry from the University of California in 1937.

NOBEL WINNER

As an instructor at the University and later as an Assistant Professor he and his associates discovered several dozen

isotopes. In 1940 their efforts during research on the atomic bomb culminated in the discovery of the important radioactive element Plutonium. Dr. Seaborg, together with E. M. McMillan, was awarded the Nobel Prize in chemistry for 1951 in recognition of their work with the transuranium elements.

Dr. Seaborg was on leave of absence from the University to the Metallurgical Laboratory of the University of Chicago from 1942 to 1946. He served as a member of the General Advisory Committee to the Atomic Energy Commission during the period 1946-50. In 1945 he became a Professor of Chemistry at the University of California and was named Associate Director of the Radiation Laboratory in 1954.

In August 1958 when Clark Kerr assumed the Presidency of the University, Dr. Seaborg was appointed Chancellor. He was honored recently by being appointed to President Eisenhower's Science Advisory Committee.

Since 1936 our speaker has written many papers on nuclear chemistry and nuclear physics and related subjects. His experience in this comparatively new field of science and his generally recognized standing as a genius, assures a very interesting program.

Glenn Seaborg Addresses Scout Eagle Honor Court

Dr. Glenn T. Seaborg, chancellor of the University of California and Nobel prize winner in chemistry in 1950, addressed Boy Scout Troop 223 and Explorer Post 223 at Stanley School Monday evening at the Eagle Court of Honor honoring William H. Hays, Jr. of Lafayette.

"A KNOWLEDGE of science is going to be important whether you are going to be a scientist or a lawyer, military man, banker, economist. This is the age of science," Dr. Seaborg said in his address.

With reference to the areas of learning in the boy scout creed, Dr. Seaborg felt that, with the spirit of adventure, there is the learning of the laws of nature, scientific technology, acquiring self-reliance, individualism, leadership, and tolerance in this age. Dr. Seaborg said, "War can be so terrible that people just must understand each other. Your Eagle Scout achievements give you good training in these characteristics."

Dr. Seaborg reviewed the his-

tory of the boy scout movement, which filled a need in the transition from the frontier age to the age of cities and industrialization.

He stated "The precepts of scouting have changed to meet the needs of modern civilization . . . the words honesty, loyalty, endurance . . . still apply today in the age of space exploration."

HE POINTED out that "one of the most important functions of scouting is bringing of fathers and sons together."

Dr. Seaborg went far in his scouting experiences, lacking one merit badge for the Eagle rank. His merit badges are among his proudest possessions.

William H. Hays, Jr., 14, of Acalanes High School, was presented the Eagle award by Dr. Seaborg.

Bill is an Explorer in Post 223. Besides his scouting achievements, Bill is forward on the basketball team.

He is the son of Mr. and Mrs. William H. Hays of 3670 Nordstrom Lane.

THE INAUGURAL MESSAGE
of Chancellor Glenn T. Seaborg

LEARNING

In the World of Change

FOR THOUSANDS of years man learned but slowly and empirically about his surroundings, his natural curiosity muted by superstition and authoritarian sanction. During long periods of history, each generation acquired from its predecessor a pattern of living and thinking, lived out its life, and transmitted the old ways, virtually unchanged, to its successor. Even the Industrial Revolution, explosive in terms of previous history, was, by our standards, leisurely.

In contrast, today we live in a world of change, a time of constant, rapid revolution. We are, and shall remain, passionately dedicated to environmental metamorphosis, as fast, in as many ways, and as drastically as possible. During the past two decades we have compressed centuries of environmental evolution, as measured by ancient criteria. We speak, too glibly but not entirely without significance, of Ages, which tumble one upon another and from which only future historians will make sense: the Electrical, the Electronic, the Atomic, the Thermonuclear Ages; the Air, the Jet, the Space Ages; the Age of Automation; the Technological, the Medical Revolutions. And the future promises ever faster evolution. Before the century is finished today's civilization may seem almost primitive.

These upheavals are accompanied by political, socio-

economic and moral contortions. Old forms and old ways yield to the new, and the new are replaced almost before our eyes. Value systems are summoned to new judgments. In the years ahead, as science and technology wrench society, millions of men and women will need to adapt to new and more complicated ways of earning their livelihood. Change is not a stranger to men, but the speed of today's change is unequaled by similar periods of the past.

During the Renaissance, men, questioning authority and the concepts of the universe itself, unleashed forces that destroyed ancient superstitions, and opened up new worlds of thought and conduct. No longer was it necessary for man to abjure aspirations to comprehend his environment. No longer needed he despair of influencing his destiny. Through exploration and education, man could understand. By understanding, man could improve himself infinitely, and accept individual responsibility for the conduct of society.

In America, and in the Western World generally, these ideas led us to insist that the glory of mankind lies in the highest development of the individual. We treasure personal dignity and the search for truth. We exalt reason. Through a liberal democracy, we maintain, a people enlightened can govern themselves better than they can be governed by one man or a few. While we seldom delude



ASUC Photo

Continued

Given peace, we must still look forward to decisive conflict . . . a contest of intellectual achievement

ourselves into believing we have perfected our ideals, we remain firm in the conviction that a liberal democracy is more promising for the betterment of mankind than any other system of which we have knowledge. And since the beginning of the Republic, we have held it to be axiomatic that the essential qualification of the individual in a democracy is education.

In the beginnings of the Republic, of course, the franchise was by no means universal, and the early proprietors of our government were for the most part well educated. But as the franchise broadened, it became accepted that common sense, together with education consisting of the three R's, was necessary for intelligent participation in a democratic society. In a slower and simpler world such an education may have served. But it is not adequate today. Neither is the education of a quarter of a century ago sufficient equipment for today's and tomorrow's World of Change.

For knowledge has mushroomed out of all bounds, and we are only at the beginning of knowledge-gathering. What we know is only enough to spur us on to greater effort. How can the individual citizen act intelligently on issues that are conditioned by forces that are outside his understanding?

IF WE had only to cope with change within our own national boundaries, we would have more than enough problems. We could readily find enough diversion in the consequences of the advances in technology and medicine, which have brought material wealth, longer life and a population explosion. But our Age of Change embraces the whole world, and the world is now a small place. The problems of others are our problems. The non-Western peoples of the world, technologically asleep several ages behind, have awakened with a start. They demand to share equally and without delay in material wealth with their Western brothers. That they will succeed, perhaps not as quickly as they or we would hope, we all acknowledge. How they succeed may well determine the nature of world civilization of the future.

For the world is now engaged in a contest, perhaps the final contest of civilization, in which the major alternatives are the ideologies of Western liberal democracy and communism. In this contest, there is, of course, still the menace of fearful war. Yet despite occasional frightening epi-

sodes to the contrary, the awareness appears to be growing that war today is a more irrational method than ever of settling international disputes. The longer we can delay violence the keener will be the awareness, and the greater the chance of reason's prevailing.

GIVEN peace, we must still look to a decisive conflict. This is a contest of ideas and of intellectual achievement and performance, in which the "blood, toil, tears and sweat" will be spent in the classrooms, the libraries and the laboratories. The skirmishes of this war, which mercifully does not involve nuclear weapons, have already begun. There was no signal, no Redcoat clanking along the road to Lexington, no bomber over Pearl Harbor, no sudden horror to arouse the people to intellectual arms. This war came upon us silently, and, I fear, while we were complacently distracted with our material pleasures and somewhat indifferent to the need for constant nourishment of our liberties. This war will end gradually, without signal, and perhaps without the defeated knowing it for some time. For in the hearts and practices of the uncommitted peoples will be the seeds of humanism or the seeds of authoritarianism, implanted by the ideological and intellectual performances of one or the other.

What must we do to adapt ourselves to our World of Change? Five interrelated factors are cogent to our success: time, complexity, values, education and research.

TIME, the lubricant of smooth operation of democracy in the past, is our least abundant commodity. Democratic judgments must be more quickly and more surely exercised than ever before.

Such judgments must be exercised of more complex problems than liberal democracies have ever faced. The progressive fragmentation and growth of knowledge makes it increasingly difficult for the individual to know enough to act intelligently.

Through inspired leadership of committed and articulate men and women from all sections of society, I believe our citizens must be convinced of the reality of the non-military trials that lie ahead. Once persuaded, I believe we will re-examine some of our values. Can we afford the present emphasis on leisure and material goods? In the harsh days of the 1930's, we dreamed of a Nirvana of

Learning in the World of Change

(Continued from page 12)

wealth, security, and leisure. As a people we have gone far toward achieving a material paradise. But are we meanwhile doing what we must to preserve the ideals upon which our Nirvana is based? As our modern patrons, the machines, free us more from physical labor, must we not do more mental work to cope with the challenges of the World of Change? Do we not need motivations in this direction as intense as those imparted by dangers from shooting wars?

IF WE need to decide more complex matters more quickly, and incidentally operate an increasingly complicated industrial and technological apparatus, we must look to the more adequate preparation of citizens. Our nation and our educational system, led by the Universities, must gird themselves for greater effort in several ways: the upward movement of the educational level of the whole population, which has been going on for some time, must be accelerated; we must search out and stimulate the fullest development of gifted young people in all creative fields; we must impart the conviction that education is a lifelong job; and we must seek a balance in educational content that will equip the intellect for the World of Change.

We are assailed on all sides by evidence of the failure of individuals to develop their talents fully.

At the present time, of the American high school graduates who rank in the top 25 per cent, apparently only about one-half go to college. Similarly, large numbers of college graduates capable of advanced study take no further academic training. Nor can our labor force be neglected; properly trained, the majority are capable of moving, and must move, up to higher, more rewarding and necessary skills. According to our creed, the individual must be free to cultivate to the utmost his own tal-

ents. If we are to survive in the contest of the intellect, we must persuade young people that fullest development of their talents will be rewarding to them and is essential to the survival of humanist ideals.

To the same ends, we must extend our efforts to rescue lost talent, among women and among minority groups. We must do more research in the development of new educational techniques, not only to get more information into people but to sharpen the individual's critical sense.

In seeking better intellectual equipment for our World of Change, we must seek a balance of knowledge that will make us more effective citizens of our time. At one time, a scholar was by definition a student of religion; at another, a student of Greek, Latin and the classics. Today knowledge is valued throughout the continuum of human experience. There is beauty in discovery, mathematics in music, a kinship of science and poetry in the description of nature, and exquisite form in a molecule. Attempts to place different disciplines in different camps are revealed as artificial in the face of the unity of knowledge. All literate men are sustained by the philosopher, the historian, the political analyst, the economist, the scientist, the poet, the artist and the musician. Above all, if it is true that the proper study of man is man, then we must always emphasize efforts to understand people in their great wonder and variety.

As we measure our educational curricula at all levels against our heritage of knowledge, we must be constantly alert to imbalances. At the present time it seems clear that one teaching modification should be made in the field of science, whose onrush to such a critical position in our affairs has caught our educational system unaware.

Science provides the momentum of our World of Change. Upon decisions

about science and technology hang the fates of peoples and ideologies, our own included. If it is true that every man in a democracy need not be an originator of policy but must be a good judge of it, then our citizens must be well enough acquainted with the general principles of science to be good judges of policy based upon it, or at least to be able to reject spurious policies founded on pseudoscience or non-science.

I WOULD wager that a Gallup Poll would disclose few Americans who feel they do not know everything about politics. A majority of us, surely, would take pride in our judgment of economics and business, although we might confess to being a little short on a few of the more complex technicalities. However, an overwhelming majority, I wager, would disclaim unabashedly, perhaps even with some pride, any knowledge of science.

It would be folly to suggest that every person become a scientist or be expected to comprehend the intricacies of arcane theories, any more than we would suggest that everyone, while we would like to have him appreciate poetry, should become a poet.

But until our people become as much at home with science as with other phases of our national life, I fear that, in the continuing World of Change, we shall have increasing difficulty living up to the ideal of an informed people as the proprietors of liberal democracy.

When I say we must seek a citizenry with scientific literacy by adding science to the curriculum, that knowledge of science should be truly a part of a liberal education, one may reply, "what shall we cut out?" Not any of the humanities, I will agree. And I can only say that science must be added. Our age of intellect requires more of us than ever before. Do we not have some margin of leisure to use up without suggesting the Draconian extremes of authoritarian systems? What I would suggest is not, I believe, an overemphasis on science in the general educational curriculum but a modest correction of what seems to me to be an underemphasis that can be fatal in our World of Change.

IN ADDITION to the teaching obligation, the University has the special charge to create new knowledge. A condition of our successful adaptation to the World of Change is the cultivation, in University centers, of incisive minds, to extend the quarrying of new meanings from nature, the perception of new relationships in human experience, and the

capture of new insights into beauty. We have become accustomed to what may seem at first glance large outlays from the Federal Government for scientific research. Yet when we measure the total funds for such investigations against the potential and the need, we find excellent estimates that support of *basic* science is less than one-half what could be invested to our great profit. If basic scientific research is impoverished, consider how poorly supported is the creation of knowledge in the arts, humanities and the social sciences, whose association with the national welfare, unlike science, has been poorly recognized. There is here an imbalance in the stimulation of knowledge-seeking, which, I believe, we must work to correct. For example, just as our University now has many sources of funds to provide scientists with periods of freedom to create, so should we be able to afford the same opportunity to scholars in the arts, humanities and social sciences.

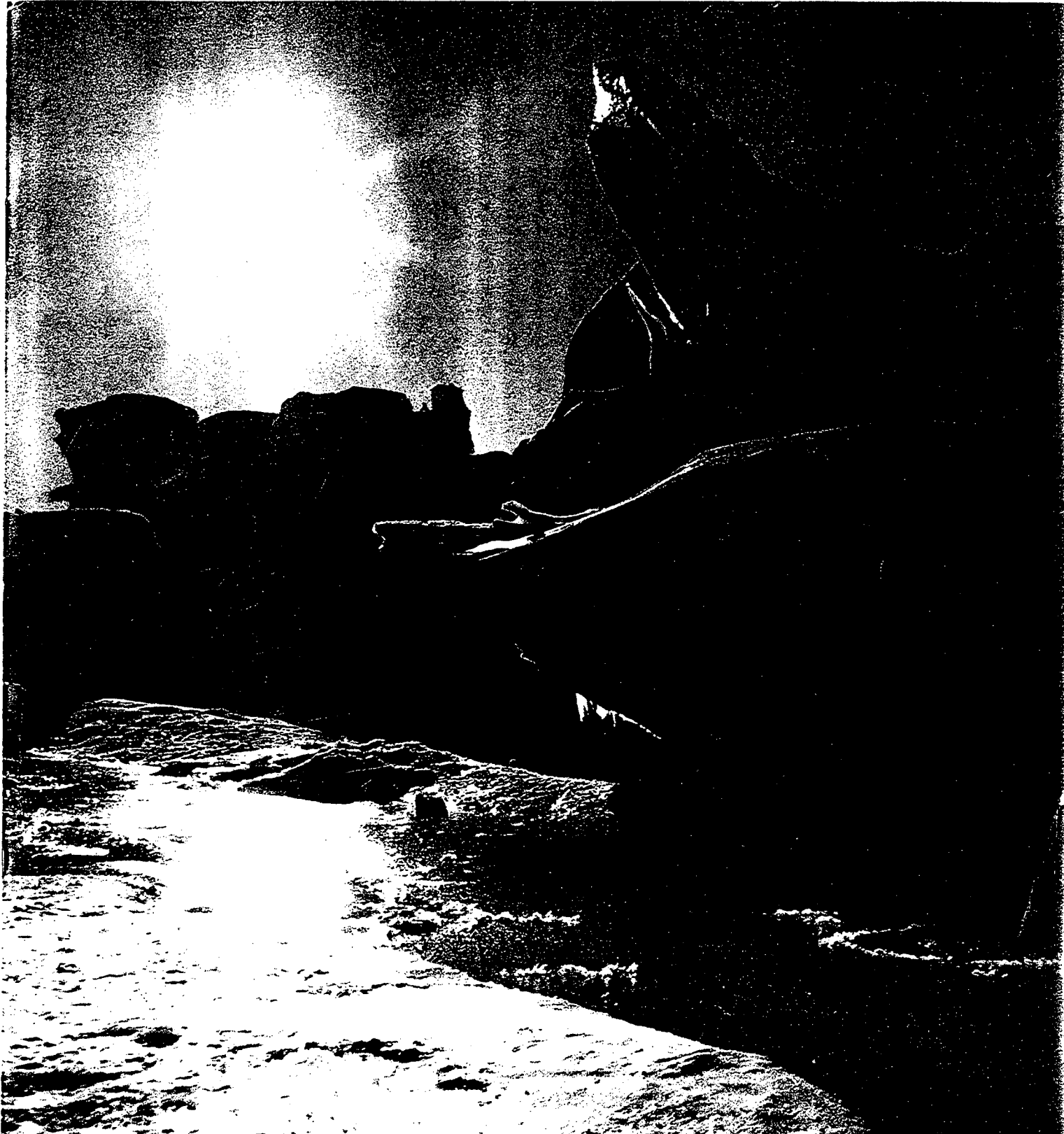
GIVEN the conditions of our World of Change, in which learning will determine the rise or fall of our culture, we as a nation, can shrink from adequate support of education only at our peril. The bill for teaching and for knowledge-seeking sometimes may seem high. Yet we are only at the beginning of the needs of a nation bursting at the seams with talented new generations whose success will depend upon their depth of knowledge and their opportunity for intellectual exploration. We have a pioneering tradition of finding ways to support the development of our frontiers. We gave away free lands in the West. We have subsidized the railroads, the airlines, the shipping industry. We cannot fail, in our great wealth, and our equally great need, to find the means to develop our brainpower, the critical resource of our age. For if it were nothing more, and it is a great deal more, education is, in the words of Burke, "the cheap defense of nations."

Perhaps the spirit of our pioneering past is the spirit we must seek for our present and future World of Change. For as we search the world for horizons, wherever we turn we see them through education. Learning and discovery are the New Worlds and the Old West, the lands of opportunity in the 20th Century. In intellectual activity there is always virgin soil to be tilled by the mind.

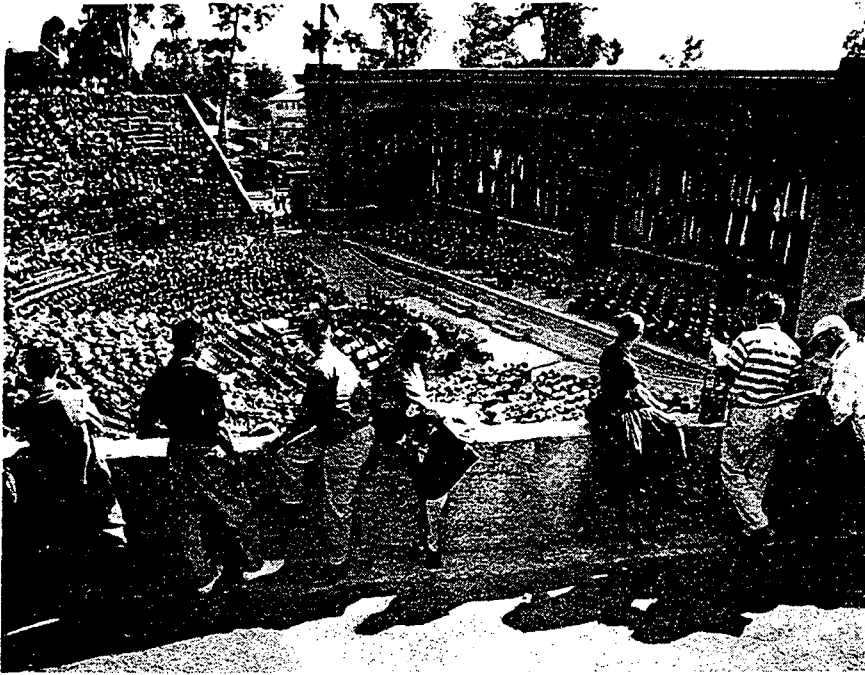
With the will to meet the future and the motivation and support for maximum fulfillment of individual talents, we can nourish the creativity and powers of judgment which perpetuate our liberal democratic ideals in the World of Change. ◀

DON'T GO NEAR THE ICE

California Monthly



May, 1959 00829



The Greek Theater decked out for the combined Charter Day and Inauguration.

ASUC Photos



U.N.'s Charles Malik presented major address.



University dignitaries gather on the Greek Theater stage to pay tribute to Chancellor Seaborg.

Inaugurating Berkeley's New Chancellor

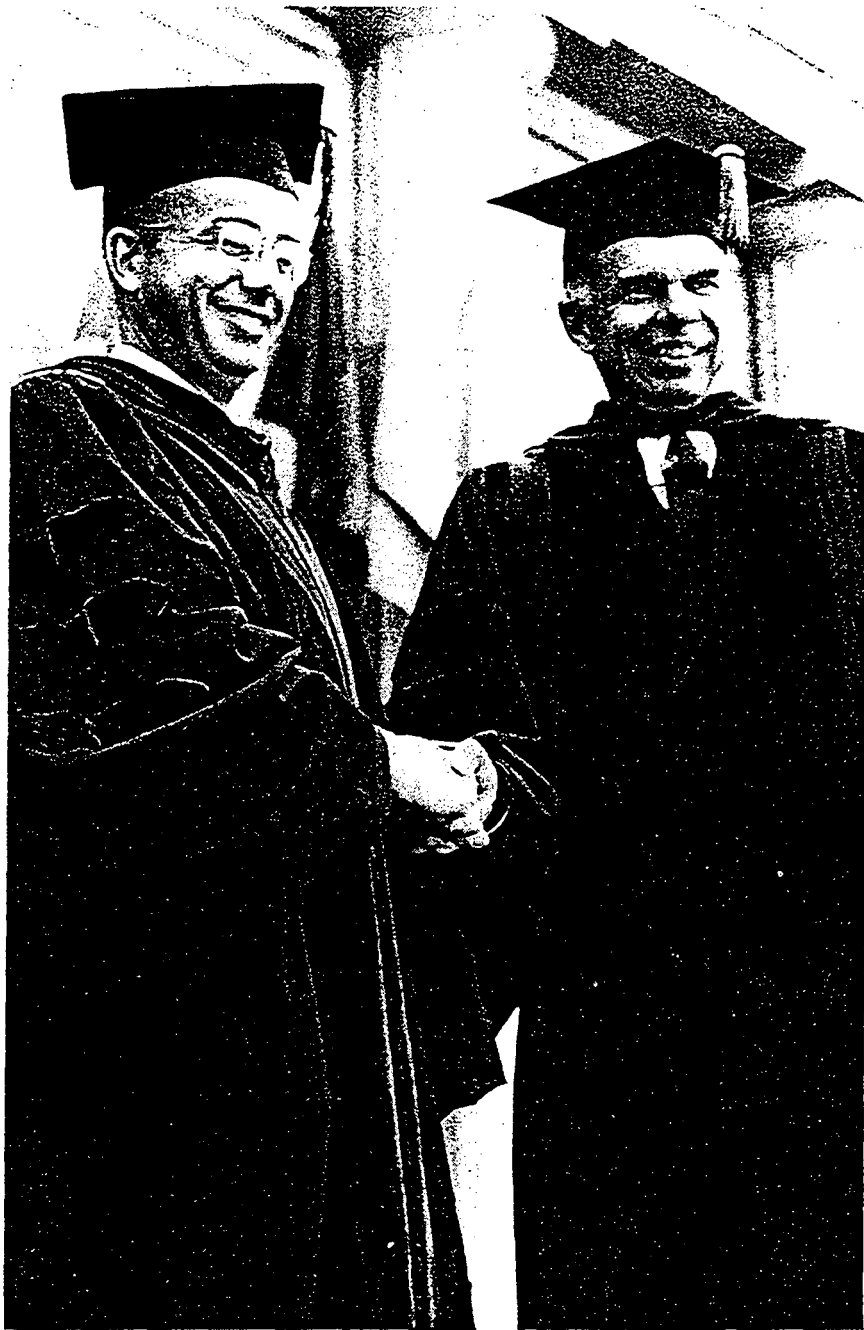
AFTER 91 years, one might expect the University of California to take its birthdays for granted. Happily, this simply isn't so at Berkeley. The event was doubly inspiring this year because it marked not only an anniversary but also the inauguration of Nobel prize winning atomic scientist Glenn T. Seaborg as second Chancellor at Berkeley.

Fifty representatives of California's institutions of higher learning came to pay respects to the new Chancellor and to swell the traditional and colorful academic procession. Chancellor Seaborg himself presented the afternoon's principal address (see page 11). Responding to President Clark Kerr's introduction, he spoke first of his personal feelings on the occasion: "It is a moment of humility . . . having for some months presided, or at least sat in the chair, as Chancellor, I have only the greatest

awe and admiration for my immediate predecessors, President Kerr and President Sproul."

Chancellor Seaborg then explained why he accepted a University administrative job when the nation so badly needs scientists. "One of my beliefs," he said, "is that there should be a blending of experience from the various fields of learning in the leadership of modern society. Surely the stewardship of a great University today is a critical forward position. When, therefore, President Kerr and the Regents approached me concerning the Chancellorship, this thought occurred to me: considering the speed with which our society is, and for some time has been, proceeding toward ultimate solutions to its problems, it seems, at the worst, unlikely that the addition of one scientist to the vanguard will materially retard the pace."

(Please turn page)



ASUC Photo

Chancellor Seaborg, right, is congratulated by his predecessor, President Clark Kerr.

Inaugurating a New Chancellor, *Continued*

He advised the vast Charter Day audience that he is not giving up the laboratory entirely. With the aid of faculty associates in the conduct of University affairs, he is permitted to engage in pursuit of scientific knowledge and, at the same time, incorporate broad representation into the conduct of academic affairs. "The helpful spirit of President Kerr, the Regents, the students, the alumni and friends of the University," Chancellor Seaborg added, "are great

sources of strength and inspiration."

During the Charter Day ceremonies in the Greek Theatre, Charles Malik, president of the thirteenth regular session of the United Nations General Assembly, also presented a major address. Representatives of the students, faculty, alumni, Regents and other institutions spoke in tribute to the new Chancellor and honorary degrees were bestowed upon two distinguished professors emeriti. (See Californians in the News). ◀

President Dwight D. Eisenhower has named Chancellor Glenn T. Seaborg to the President's Science Advisory Committee. Headed by James Killian, president of the Massachusetts Institute of Technology, the committee is composed of a small group of leaders in American science who advise the President on policy in scientific and technical fields.

CALIFORNIANS IN THE NEWS

Appellate Justice Raymond E. Peters '25 has been named by Governor Edmund C. Brown to the California Supreme Court to fill a vacancy created by the death of Jesse W. Carter.

President Dwight D. Eisenhower has named Chancellor Glenn T. Seaborg to the President's Science Advisory Committee. Headed by James Killian, president of the Massachusetts Institute of Technology, the committee is composed of a small group of leaders in American science who advise the President on policy in scientific and technical fields.

One of the American Chemical Society's most prized awards, the 1959 Precision Scientific Company Award in Petroleum

A man of strong convictions, his opinions have often set off heated legal controversy. Chief Justice Earl Warren described him as a man who "never ran from a fight in his life." Denman's wife, Leslie, died earlier in the year and Judge Denman had been in ill health.

A \$1500 Creative Arts Award was presented to Seymour Shifrin, assistant professor of Music on the Berkeley campus by Brandeis University last month. The award recognizes Shifrin's outstanding musical accomplishments as one of America's foremost younger composers.

Dr. Henry B. Peters '38 has been selected Optometrist for the year for the

ASUC Photos



The University's Highest Honor was bestowed on two distinguished scholars on Charter Day. Congratulated by President Clark Kerr above are left, Albert E. Elkus, professor of music, emeritus who retired in 1951; and, right, Edward C. Tolman, professor of psychology, emeritus who retired from the faculty in 1954.

Chemistry, has been awarded to George C. Pimentel, associate professor of chemistry at Berkeley. The award honors Pimentel "for discoveries involving the application of infra-red spectroscopy to the study of free radicals and other reactive chemical species."

William Denman '94, one of California's best known jurists, committed suicide at his home on March 10. He was 86 years old. Judge Denman retired as chief judge of the Ninth U. S. Circuit Court of Appeals in 1957 after 22 years on the bench. Even after his retirement, however, he continued close association with the court and spent most of the day he died working on his last opinion.

State of California. He received the title in March at the California Optometric Association Congress in San Francisco. Earlier, he was named Optometrist of the Year by the Alameda-Contra Costa Optometric Society. Dr. Peters is a specialist in prevention of eye injuries and the study of the relation of work accidents to uncorrected vision problems.

The Buffalo Evening News picked Seville Chapman '34 as one of Buffalo's ten outstanding citizens for 1958. Chapman was selected on the basis of his work as head of the Physics Division at Cornell Aeronautical Laboratories. His research extended the range of radar to detect enemy missiles. ◀

July 1959

SIR JOHN COCKCROFT VISITS LABORATORY

Sir John Cockcroft, Director of the Atomic Energy Research Establishment at Harwell, England, recently visited the Laboratory. He and Professor E. T. S. Walton developed the Cockcroft-Walton accelerator, a high-voltage apparatus that could speed protons. With their crude little prototype of today's big machines they performed the first artificial disintegration. They bombarded lithium-7 with protons and produced lithium-8. For their research in this work they were awarded the Nobel Prize in 1951.

"We did our experiment in a very old and very dirty laboratory," he said, "and we used the usual sealing wax, stray

pieces of wire, and so on, all stuck together in a primitive fashion."



Dr. Glenn Seaborg (Associate Director), Sir John Cockcroft, and Dr. Edwin McMillan (Director) recall the Nobel ceremony.

Ev 8/9/59 DuKland Tribune

Atom Held Power Source of Future

America 25 years from now—with a population half again as large as today's—will require three times as much electric power energy as is now being produced.

To meet this demand, Dr. Glenn T. Seaborg, Nobel-prize winning University of California nuclear chemist, said the nation's only alternative is development of a vast system of atomic-driven electric power networks.

Dr. Seaborg, speaking this noon before the Commonwealth Club of California at the Sheraton-Palace hotel, said the nation's fossil fuel resources—coal, wood, gas—will not be adequate to meet the electric power requirements by the end of the next quarter century.

OUTPUT GROWS

In addition, the nation's energy consumption per capita has been increasing by 3 per cent annually, he said.

At this rate, America's power needs by 1980 must be three times greater than today's, by times greater than today's, and by then our conventional resources will be in the same fix as most of Europe and Asia's are in now.

Great Britain, he noted has had to turn to atomic energy to survive as a first-class power.

But, the road toward the peaceful uses of the atom is a rocky and perilous one.

Disposal of tremendous quantities of radioactive waste products—such as strontium, cesium and other "hot" materials which have caused so much consternation with bomb experiments—is the major problem, Dr. Seaborg noted.

Disposal of these materials will probably be the limiting factor which will determine the extent to which atomic energy can be peacefully applied, he said.

Nuclear-powered ships, the first of which is already on the way, will soon be commonplace in the American Merchant fleet. These ships will have a range of 350,000 miles before refueling.



DR. GLENN T. SEABORG

Looks to Future

LONG WAY OFF

On the basis of declassified reports from the highly secret Sherwood Project, Dr. Seaborg predicted that use of peaceful and controlled fusion of light elements—the energy of the suns and H-bomb—will be a long way off.

But, the tremendous scientific endeavor to learn the necessary technical secrets to master fusion is equally important

to America and mankind in general, he said.

The raw materials to operate such a plant are limitless, and the end products from hydrogen fusion are not radioactive.

Dr. Seaborg called for increased emphasis of science instruction in California's grade and secondary schools.

He argued that science has become one of the so-called hu-

August 19, 1959

New Grid Deal?

Major Shakeup In UC Athletics

By Dick Frlendlich

The University of California is considering some major changes in the administration of its athletic program, The Chronicle learned yesterday.

The changes include (1) Transfer of control of intercollegiate athletics from the Associated Students to the office of the Chancellor, Dr. Glenn T. Seaborg; athletic director in place of the incumbent, Greg Engelhard.

Rumors of possible changes at Berkeley have been circulating for several months. Yesterday The Chronicle learned from a source it considers a responsible one that these adjustments would be made very shortly.

NO DECISION

Clark Kerr, president of the University of California, was asked if the two specific reports were true.

"I cannot comment on that," he replied. "I refer you to the office of Chancellor Seaborg."

Said Seaborg: "No such decisions have been made."

Asked if the changes were now being considered, he replied that the entire picture of athletic administration, both at Berkeley and at UCLA, has been studied since December by a 13-man intercollegiate athletic advisory council appointed by Kerr.

ONE OR OTHER

"Is it possible that control of athletics may be taken from the ASUC and placed under your office?" he was asked.

"It is possible," Seaborg admitted. "It is also possible to reach a decision that will leave it the way it is, and it is possible also to set up a system of dual responsibility between students and administration."

Seaborg reiterated that he knew of no such recommendations, but he did not deny that they were under consideration.

The advisory council is made up of the chancellors from each campus—Berkeley and Westwood—the two athletic directors, the two student body presidents, the alumni association presidents, the vice chairmen of the academic senate, and presided over by a chairman, Thomas J. Cunningham, vice-president and general counsel of the University.

In that connection, it is interesting that the president-elect of the California student body, Dave Armour, last Friday recommended that control of athletics be taken away from the ASUC.

Interviewed by the Daily Californian, Armour said: "Athletics are run too professionally for students to manage. The ASUC has just been a rubber stamp for the University, anyway. Personally, I favor de-emphasis of football. I'd like to see it on a state wide basis, but along intramural lines."

However, the rumored dissatisfaction within the athletic department and among some alumni doesn't spring from any desire to return football to intramural status.

On the contrary, it stems from a belief that California's recruiting program for athletes is not aggressive enough and that the major sports schedules, football and baseball, are too heavy for the type of material the Bears get. High admission standards block many athletes that Berkeley would like to have.

The situation is unusual in that Engelhard has been criticized in some quarters. California's football team won the Pacific Coast Conference championship last fall and its basketball team the national title. Ordinarily, an athletic director would share in the credit for those accomplishments, but so far Greg hasn't been cited in dispatches.

Lafayette Sun 8/28/59

Dr. Glenn Seaborg Will Address Local Teachers

Featured speaker for Orientation Week (August 31 through September 4) for all teachers and principals of the Lafayette School District will be Dr. Glenn T. Seaborg, chancellor of the University of California's Berkeley campus.

Dr. Seaborg will speak at the combined district and Lafayette Teachers' Association meeting to be held in the Stanley School Auditorium Thursday morning, which will highlight next week's orientation activities.

ACCORDING TO Don Williams, district administrative assistant, Thursday's meeting will be the first time during the year when all certificated personnel of the district have the opportunity of getting together and meeting each other.

The session, which will get under way with a coffee period at 8:30 a.m. and is scheduled to end at 12:15 p.m., will also provide the opportunity for all to meet and heard from W. B. Ellis, district superintendent, and Boardman Moore, chairman of the district's board of trustees.

Frank Walrath, president of the LTA, will chair the meeting and will discuss the teachers' group

and introduce its officers and committee chairmen.

ORIENTATION WEEK activities will begin Monday, when all new personnel to the district are scheduled to be in their respective schools during the morning and afternoon.

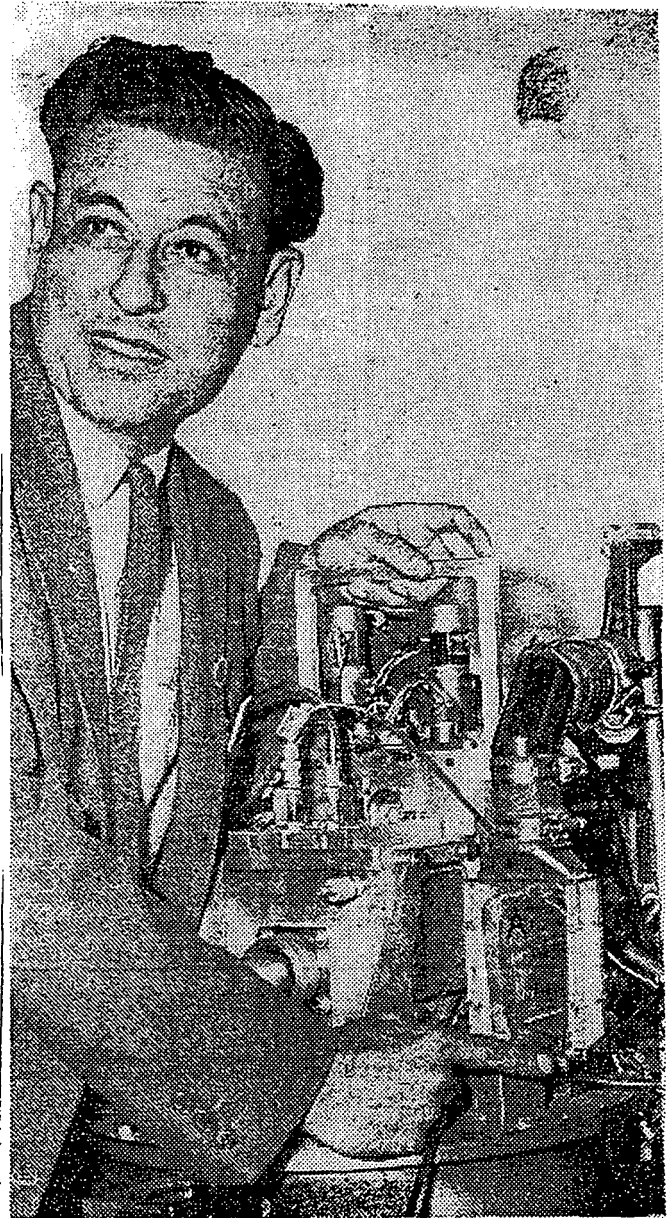
The new personnel will meet at the district offices at 9 a.m. Tuesday to meet and become acquainted with the district's personnel and services.

From 10:30 a.m. Tuesday on these new teachers and principals will meet at their own schools, and all day Wednesday all district personnel are scheduled to meet with their principals.

FRIDAY, SEPTEMBER 4, has been set aside for the necessary district meetings, and all personnel not occupied by these specific meetings will be at their respective schools.

Meetings on Friday will be held by district personnel in the following fields:

Kindergarten identification, arithmetic in the seventh and eighth grades, fifth grade testing, report cards in the sixth and seventh grades, third grade social studies and student funds.



ALBERT GHIORSO AND HIS ATOM CATCHER
... He looks inside rare elements with this machine

Science-minded viewers might find tonight's "Making Elements" at 7:30 over KQED exciting and dramatic. U.C.'s Dr. Glenn Seaborg and associates will demonstrate how they isolate and identify a new element, Mendelevium.

Seaborg New Magnet U. C. Chancellor 2/59

Dr. Glenn Seaborg, Associate Director, was appointed Chancellor of the University of California at Berkeley effective August 15. Dr. Seaborg also will continue as Associate Director of the Laboratory. He will succeed Dr. Clark Kerr, who recently became President of the University.

Dr. Seaborg earned his A.B. from the University of California, Los Angeles, and his Ph.D. from the University of California, Berkeley, both in chemistry. He began his chemistry career as Laboratory Assistant to the late Dr. Gilbert Newton Lewis, then Dean of the College of Chemistry at Berkeley.

In 1939 Dr. Seaborg became an instructor on the Campus and two years later was promoted to Assistant Professor. In 1940 Dr. Seaborg and his associates discovered plutonium, which was so important to the atomic-bomb project. In the spring of 1942, shortly after the Pearl Harbor attack, Dr. Seaborg was asked by the United States Government to work on the Manhattan Project in Chicago, the organization set up to develop the atomic bomb.

Dr. Seaborg returned to the University in May 1946 as full Professor at the University and was appointed Head of the Chemistry Department for the Radiation Laboratory. In 1954 he was appointed an Associate Director of the Laboratory.

Dr. Seaborg, one of the outstanding scientists of our time, has been the recipient of numerous honors, the most notable being the Nobel Prize, which he shared in 1951 with Dr. Edwin McMillan (also Associate Director of the Laboratory) for pioneering work on the transuranium elements. He has been a Lecturer at several colleges and appointed to a number of high-ranking committees and posts. He has been the au-

thor or co-author of nearly 160 books, articles, and papers on nuclear studies and with his associates has compiled a complete table of isotopes.

Along with carrying out his busy scientific career, Dr. Seaborg has been Faculty Athletic Representative for the Berkeley Campus. In his acceptance statement following the Regents' meeting on July 18, Dr. Seaborg said, "We must exercise care to have a proper balance between the humanities, the professional areas, the social sciences, and the physical and natural sciences; and we must never allow an over-emphasis in any one of these areas of scholarship."



Dr. Glenn Seaborg

Given to John Hofman

THE NEW YORK TIMES, SUNDAY, SEPTEMBER 20, 1959.

U. S. THORIUM PLANS RECALL DISCOVERY

BERKELEY, Calif. — How University of California scientists discovered that atomic energy could be obtained from thorium was recalled here with the announcement that the Atomic Energy Commission had launched a long-range thorium development program.

Early in 1942 a scientific team here discovered that an isotope of thorium could be transmuted into uranium-233, and that this synthetic uranium isotope was fissionable with slow neutrons.

Fissionability with slow neutrons means that a chain reaction can be maintained, and power extracted from the U-233.

The discovery has received little attention, however. The main reason is that the wartime atomic project concentrated on U-235 and also on plutonium, which the University of California scientists had discovered just a few months before U-233.

Plutonium is made from uranium, just as U-233 is made from thorium.

The scientists who found the key to atomic energy in thorium are Dr. Glenn T. Seaborg, now Chancellor of the Berkeley campus and a Nobel Laureate; Dr. John W. Gofman, now professor of medical physics at Berkeley; and Dr. Raymond W. Stoughton, now of Oak Ridge National Laboratory.

The Atomic Energy Commission program calls for long-range development of reactors that would use thorium, and that would add the earth's vast deposits of thorium to uranium as energy sources of the future.

Scientific Rivalry Between Nations

U.S. Must Struggle to Keep Ahead of Soviets

By GORDON CHAPPELL
The Soviet Union has not passed the United States in scientific progress, Chancellor Glenn T. Seaborg said Monday.

"I think we have a stronger foundation, and while I hate to see the first shoe I think we are ahead," Seaborg said. "But the Soviets rate the sciences so high and are so dedicated to research they'll probably pass us unless we're careful to push ourselves."

Seaborg relaxed in a comfortable chair in his modern Dwight D. Hall conference room as he expounded his views on science in America. Tall and well-built, he looks more like a football end than a Nobel Prize-winning chemist.

RIVALRY IS HEALTHY

"I think, basically, rivalry between the countries is a healthy thing," he said. "In basic science and its peaceful aspects, that is—of course, no one can say that necessary attempts to develop better bombs represent a desirable situation."

Seaborg leaned on the arm of the chair and paused a moment. "Yes, from a prestige position it is important, it is inevitable, that

we pursue research with an eye toward beating Russia to new developments.

"It would have been much better if we had been even with the Soviets in space research. It is important, prestige-wise, not to let their guidance us in some of these discoveries," Seaborg reiterated.

TEACHER'S PAY

In order to keep up a high rate of progress, Seaborg proposed expansion of our budget for basic scientific research in the U.S. "We should also pay our teachers

Football Tickets

Saturday is the deadline for purchasing tickets for the UCLA game to be played Oct. 17 in Los Angeles.

The price is \$1.75 with an athletic privilege card.

Cal-Stanford Big Game roster tickets will be on sale until Oct. 18. The price is \$2 with a privilege card.

Student roster tickets will be sold from 8:30 a.m. to 5 p.m., including the noon hour, at the ASUC ticket office, M-I Stephens Union.

relatively more than we do," he said.

"But I don't see why this has to be at the expense of other fields—we can afford research and development in other fields, too."

Seaborg also said that he considers the humanities underreported in relation to the sciences and that the sciences are overemphasized, he explained. "We should increase relatively our support of other fields."

BETTER BALANCE

"I hope to work for a better balance between science and the humanities," Seaborg said. "I'm beginning to explore ways to do this. There seems no way to get backing in other fields similar to that in science. The government is not so much interested."

Asked whether or not we are behind in teaching science, Seaborg replied, "It just depends on what you're talking about. We're way behind in teaching science to non-science majors at the university level. It is just that science is with us today and the general public doesn't have the knowledge to go with this progress."

"We should improve teaching of mathematics from elementary

schools through high schools—this is the most important area where improvements are needed."

NOT TOO MANY

"I don't think we should have a disproportionate number of our people in science," he continued. "People should be interested in fields other than their own," Seaborg explained. "A liberal education has to include a balance."

"A scientist, for instance, can't be a complete individual and live a satisfactory life without some grounding in the humanities. Someone in the humanities must have a grounding in the sciences to be an intelligent voting citizen today."

A CHALLENGE

"I became Chancellor because the job presented a challenge," Seaborg said. "Also, it gave me the opportunity to exert some influence on a broader basis on some of the problems facing the country."

Seaborg said that he hoped he could help increase the scientific literacy of our land. "The position of Chancellor would open doors to me in educational councils in Washington, where my influence

would be felt more. . . . On the other hand, being Chancellor has its disadvantages, Seaborg said. "What I don't like about it is the great demands placed on one. The schedule is so heavy all of the time," he complained. The

combination of paperwork and speeches and social functions and traveling make tremendous demands on one's energy, Seaborg said.

BREADTH OF EXPERIENCE

"I'd say what I like about being Chancellor is the breadth of experiences, contacts with people in many fields, and association with students," Seaborg said.

Seaborg emphasized that he accepted the position on the premise he could still continue work in science.

"I go up to the Radiation Laboratory on schedule—two or three periods a week, a few hours each time, sometimes more, sometimes less. And I do manage to read scientific journals evenings and weekends and to do some writing."

DIRECT RESEARCH TOO

"I also have a few graduate students whose research I'm directing," Seaborg added. He said that he is continuing the investigation of the heaviest chemical elements. Seaborg could not say when a breakthrough would come in this research. "When you're looking for a new element it's a discontinuous process," he said. "It is difficult to know how close one is."



CHANCELLOR SEABORG

LAFAYETTE SUN

September 1959



TEA—U.C. Chancellor and Mrs. Glenn Seaborg (left) greet senior Charles Hall and his parents, Mr. and Mrs. Fred Bardo, in a reception line at the chancellor's tea.

Industrial Uses of Atomic Energy Limited in Near Future - Seaborg

Atomic energy will not be a significant factor in industrial strength during the next quarter century, according to Chancellor Glenn T. Seaborg.

Seaborg expressed this opinion as the keynote speaker at the International Conference on Public Personnel Administration which opened yesterday in San Francisco.

Right now, the United States is ahead of Russia in this field, Seaborg said. However, the percentage of power the United States derives from the atom is minute, the Chancellor added, even though it surpasses that of Russia.

"Our present superiority in industrial atomic power output gives us no essential advantage over the Russians," Seaborg said. "We obtain energy from many sources, and, except for special uses, it is not very important what sources

we use at the present time.

"Both Russia and the United States will develop atomic energy in their own ways, according to their own needs. Eventually, it will be important for us to have a significant part of our industrial energy come from nuclear sources.

"However, the time scale for such development is long. By the time it becomes important for either country to have a large portion of its power coming from the atom, both countries will have atomic power in comparable quantities," he said.

Seaborg contrasted the development of nuclear weapons with that of industrial atomic power. In the case of weapons, he said,

the time scale was short. The Russians needed the weapon in a hurry, because it is an important, irreplaceable instrument of power.

The larger time scale permits us to develop atomic energy on a broader basis and await technological developments, he said.

Seaborg said America should continue to pursue a vigorous program of nuclear power development for industry because such power will be needed eventually.

Nuclear energy for special uses is another question, Seaborg said. Nuclear power development for submarines, ships and for geographical areas where it is economical should be pushed with all speed, he concluded.

(Release Tuesday Morning, Oct. 13) 1957

Atomic Power 'Race' Discussed by Seaborg

BERKELEY, Oct. 12.—Whether the United States or Russia is ahead in the "race" to develop atomic energy for industrial power will not be very important in determining the relative strength of the two nations in the next quarter of a century.

This was the opinion expressed recently by Dr. Glenn T. Seaborg, Nobel Laureate in nuclear science and Chancellor of the Berkeley campus of the University of California, in the keynote address opening the International Conference on Public Personnel Administration in San Francisco.

Right now, the United States is "ahead," Dr. Seaborg said. However, the percentage of power the United States derives from the atom is miniscule, the scientist added, even though it surpasses that of Russia.

"Our present superiority in industrial atomic power output gives us no essential advantage over the Russians," Dr. Seaborg said. "We obtain energy from many sources, and except for special uses, it is not very important what sources we use at the present time.

"Both Russia and the United States will develop atomic energy in their own ways, according to their own needs. By the time it becomes important for either country to have a large portion of its power coming from the atom, both countries will have atomic power in comparable quantities."

Nuclear energy for special uses is another question, Dr. Seaborg said. Nuclear power development for submarines, ships, and for geographical areas where it is economical should be pushed with all speed, he concluded.

President Kerr Clarifies Recent

(Editor's note: The following is the text of University President Clark Kerr's statement clarifying the directives on the Use of University Facilities and the Recognition of Student Organizations.)

During the past year the University of California has been undergoing substantial administrative reorganization. A major part of this reorganization has consisted of the decentralization of administrative authority, thus giving Chief Campus Officers increasing responsibility for affairs on their respective campuses.

In the course of this process of reorganization it became necessary in the student affairs area, as in many others, to review the governing statewide policies, to determine the extent of the authority to be delegated to the Chief Campus Officers, and to codify the policies guiding administration on the several campuses.

Drafts of proposed regulations were circulated by the President to members of his immediate administrative staff and to Chief Campus Officers during the Spring Semester, 1959.

Chief Campus Officers were requested to consult with faculty and student groups on their campuses and to report the results of such consultation. There was consultation among faculty members and students by Chief Campus Officers on all campuses during the spring semester.

Furthermore, the President consulted directly with the Committee on Academic Freedom of the Northern Section of the Academic Senate, and on two occasions with the assembled Deans of Students.

Following these consultations, I issued on Oct. 22 regulations on the subjects of Use of University Facilities, Student Organizations, and Student Government. Since these regulations have been the subject of much discussion and considerable misunderstanding, I am making the following added comments in an attempt to clarify the situation.

USE OF UNIVERSITY FACILITIES AND STUDENT ORGANIZATIONS

Students at the University of California have now and have always had the complete freedom of all citizens to participate in international, national and local affairs. They may engage in the wide variety of organizations and activities which are open to citizens generally.

Directives

In the exercise of this freedom they have organized many off-campus groups for the purpose of expressing their varying viewpoints. Political groups, religious groups, special interest groups of many kinds are readily available to students desiring such participation.

Beyond these general freedoms of every citizen to participate in community, political, religious and intellectual life, students understandably want to bring as much as possible of this "outside" life to the campus where they must of necessity spend so much of their time.

And, in fact, the recent history of the University has been marked by a continuing increase in the freedom of students and student groups to utilize campus facilities for the discussion of the controversial issues of the times.

The most notable development in this regard was the amendment of Regulation No. 17 in 1957. This amendment liberalized the conditions under which student groups could bring to the campuses speakers on and discussions of controversial issues.

Furthermore, it extended similar privileges to off-campus student groups composed exclusively of University students. Under this revised regulation the students have, in fact, brought to the campus diverse points of view. As a Chancellor, I participated most actively in this development.

The new regulations on Use of University Facilities and Student Organizations extend even further this development of the freedom of the individual student to hear and to discuss controversial issues on the campuses by permitting for the first time the establishment of rules under which candidates for public office and the opponents and proponents of election propositions may appear on the campuses and espouse their causes.

Aside from the liberalization, these regulations are in the main a restatement of matters covered in Regulation 17, as revised in 1957, with a delegation of authority to the Chief Campus Officers to make the necessary detailed rules.

Sixth Child For Seaborgs

Mrs. Glenn T. Seaborg gave birth to an 8 pound, 6 ounce daughter at 12:03 a.m. yesterday morning.

The girl, named Diane Karol, is the sixth child born to Chancellor and Mrs. Seaborg.

She is the second daughter; the Seaborgs also have four sons. The children are Peter 13, Lynn 12, David 10, Stephen 8, John Eric 5, and Diane Karol.

The Nobel Prize winning Chancellor and his wife Helen have been married 17 years.

Diane Karol was born in Kaiser Hospital, Walnut Creek. The hospital reports that mother and daughter are doing fine.

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Delete

Seven Nobel Laureates

UC Science Faculty Among Finest

Seven Nobel Prize Laureates are teaching and doing research work on the Berkeley campus of the University.

These seven men are the vanguard of a faculty that is known throughout the world for its pioneering work in the sciences.

In the field of the biological and physical sciences the University can claim no less than 34 faculty members who are members of the American Academy of Sciences and 23 recipients of Fulbright and Guggenheim grants.

Outstanding among the University's achievements has been its work in nuclear physics. It was here at Berkeley that the late Ernest Lawrence began his work which led to the building of the first cyclotron and the following research that delved into the innermost secrets of the atom.

For his work, Lawrence was awarded the 1939 Nobel Prize in physics. Lawrence's award was the first Nobel prize won by a faculty member while at the University. Throughout World War II mem-

bers of the Berkeley faculty worked on the various projects that were to culminate in the violent explosion that rocked Japan and plunged the world into the Atomic Age. One of the chief figures in this development was the man who is now Chancellor at Berkeley, Glenn T. Seaborg.

Seaborg and the men who worked with him developed the methods by which plutonium, the raw material for atomic explosions, could be collected in sufficient amounts to sustain a chain

reaction.

After the war Seaborg worked with Edwin McMillan, now director of the University's Lawrence Radiation Laboratory, in the research that created many of the presently confirmed transuranium elements. Using the facilities of the cyclotron, they accelerated nuclear particles to fantastic speeds and caused them to collide with other nuclei, creating synthetic elements that have no natural existence on the earth.

For their work with the transuranium elements, Seaborg and McMillan shared the 1951 Nobel Prize in chemistry.

The most recent accolade to be received by the University faculty came only last week when Owen Chamberlain and Emilio Segre were notified that they were the winners of the 1959 Nobel physics prize.

The 1959 prize was awarded to the two men for their work at the radiation laboratory that led to the confirmation of the existence of the anti-proton.

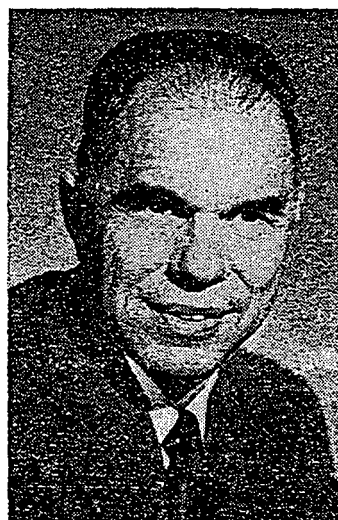
Other U.C. faculty members who have received Nobel Prizes include John Northrop and Wendell Stan-



OWEN CHAMBERLAIN



EMILIO SEGRE

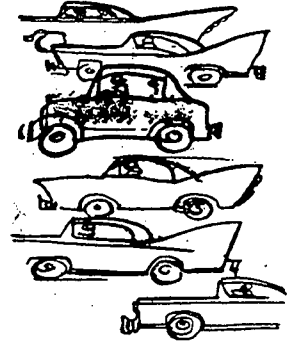


GLENN T. SEABORG

o o o o

On Mt. Diablo Blvd.

Attorneys Fred Haley and William McInerney are pondering the social significance of a recent experience. They were tooling along Mt. Diablo Blvd. in their car as flashy new cars whipped past—cars with yards of chrome, five-foot fins, self-opening windows, self-closing doors, self-moving seats, tire blower-uppers, elegant foot-warmers. In these cars sat insurance men, advertising men, doctors, attorneys, stock - and - bondsmen, dentists, merchant chiefs, executives and not a few ribbon clerks.



Eventually Haley and McInerney passed a car. This vehicle was a late forties model, a noble but asthmatic job which seemingly might expire any moment.

And behind the wheel of this decrepit car serenely sat Dr. Glenn Seaborg, one of the great explorers of the atom, and a Nobel prize winner.

—THE KNAVE.

Berkeley, California, Wednesday, November 4, 1959

Seaborg Comments On Directives

Yesterday, the students of the Berkeley campus read President Kerr's statement concerning his delegation to the chancellors of authority over student affairs. These regulations spell out clearly the policies we have actually followed for many years.

I believe a delineation of policy is itself good policy. I am particularly pleased that in this area, as in others, the President is following a program of providing for a maximum exercise of authority locally.

Any idea that these policy statements will be interpreted in such a way as to be more restrictive of student affairs than in the past is without foundation.

—Chancellor Glenn T. Seaborg

Beck. Gaz
11/13/54

Glenn Seaborg, UC Chancellor, Wins AEC Award

Chairman John A. McCone today announced in Washington, D.C., that Dr. Glenn T. Seaborg, eminent nuclear scientist and chancellor of the University of California, has been named to receive the Atomic Energy Commission's Enrico Fermi Award for 1959.

The award, consisting of a medal, a citation and \$50,000, will be presented to Dr. Seaborg for his outstanding work in the field of nuclear chemistry, including the discovery of plutonium and other transplutonium elements, and for his leadership in scientific and educational affairs. The award was recommended by the General Advisory Committee of the Commission and was approved by President Eisenhower.

Dr. Seaborg succeeded President Clark Kerr as chancellor of the Berkeley campus in August, 1958. He is currently supervising four graduate students in nuclear chemistry, and is an active member of President Eisenhower's Science Advisory Committee. The citation of Dr. Seaborg reads as follows:

"For discoveries of plutonium and several additional elements and for leadership in the development of nuclear chemistry and atomic energy."

PRESENTATION DEC. 2

Dr. Seaborg will be presented with the award at a ceremony in the auditorium at commission headquarters in Germantown, Md., Dec. 2, the seventeenth anniversary of the day the late Enrico Fermi and his team of nuclear scientists proved that nuclear fission could be self-sustained and controlled when they operated the world's first reactor in a squash court under the stadium at Stagg Field at the University of Chicago.

The Advisory Committee's unanimous recommendation of Dr. Seaborg to receive the award was contained in a letter dated Sept. 12 from Warren C. Johnson, chairman of the committee, to McCone. The documentation in support of the committee's recommendation, reads:

"Dr. Seaborg is a pioneer in the field of nuclear chemistry, and he has attained international renown as a great leader in that field.

"His discovery, with Kennedy and Wahl, of the element plutonium, together with his elucidation of its chemistry by experiments, constitute a major scientific achievement. This work made possible the plutonium reactor cycle. Dr. Seaborg's later work in the discovery of the new lengthy series of elements heavier than plutonium and the investigation of their properties has contributed in a major way to our understanding of nuclear structure and the chemistry of the heavy elements.

OUTSTANDING LEADER

"Dr. Seaborg is also an outstanding leader in scientific and educational affairs. He has served on several of the most important government committees and is now chancellor of the University of California at Berkeley. Many students have received their training in nuclear chemistry as well as inspiration and enthusiasm for a scientific career from Dr. Seaborg. He was also one of the first to appreciate the opportunity offered by television to communicate knowledge and understanding of science to a broader audience. American science is stronger in many respects because of the outstanding contributions of Dr. Seaborg."

Dr. Seaborg is the fourth recipient of the Enrico Fermi award. The first was the late John Von Neumann, noted scientist and mathematician and member of the Atomic Energy Commission, who was honored in 1956. The late Dr. E. O. Lawrence, inventor of the U.C. cyclotron, received the award in 1957 and Dr. Eugene P. Wigner, renowned authority on theoretical physics, in 1958. The first to receive an award conferred under authority of the Atomic Energy Act of 1954 was the late Dr. Fermi, on recommendation of the General Advisory Committee in November, 1954. When Dr. Von Neumann was

elected to receive the award in 1956, the commission decided that thereafter it should bear Dr. Fermi's name.

The Enrico Fermi Award, which is authorized in a section of the Atomic Energy Act of 1954, may not be granted more often than once annually and in an amount not exceeding \$50,000 to any one individual. If the award is made to more than one person, the total amount still is \$50,000.



GLENN T. SEABORG
Nuclear science honor

Seaborg Wins Fermi Prize ---\$50,000

Dr. Glenn Theodore Seaborg, Chancellor of the University of California's Berkeley campus, was named yesterday to receive the Atomic Energy Commission's \$50,000 Enrico Fermi Award for 1959.

The 47-year-old nuclear scientist, already a Nobel laureate in chemistry, said the money will be "helpful" in the education of his six children. His youngest, a girl, was born two weeks ago.

The award, which includes
See Page 4, Col. 2

Seaborg.

\$50,000 for UC Scientist

Continued from Page 1

a medal and a citation, was recommended by the General Advisory Committee of the commission and was approved by President Eisenhower.

It cites Dr. Seaborg's discoveries of plutonium and several additional elements and his "leadership in the development of nuclear chemistry and atomic energy."

Dr. Seaborg, interviewed before he left for Washington, D. C., for a meeting of the President's Science Advisory Committee, said:

"I have a feeling of pleasure because of the recognition the award gives to the nuclear chemistry group in the Lawrence Radiation Laboratory and to the laboratory itself."

Dr. Seaborg continued as associate director of the laboratory when he was named chancellor in July, 1958.

He will be presented the award at AEC headquarters in Germantown, Md., on December 2, the 17th anniversary of the day the late Enrico Fermi and his colleagues proved at the University of Chicago that nuclear fission could be self-sustained and controlled.

Dr. Seaborg was at the University of Chicago during World War II as chief of its metallurgical laboratory.

The son of a Swedish immigrant, the scientist was born in Ishpeming, Mich. He worked in a warehouse as a laborer before entering the University of California at Los Angeles in 1929.

12/2/59

The Element Hunter

Glenn Theodore Seaborg

Special to The New York Times.

BERKELEY, Calif., Dec. 2—When Glenn Theodore Seaborg shared the Nobel Prize in chemistry in 1951, the news did not cause a ripple in the junior population of neighboring Lafayette, where he lives, eleven miles east of the University of California campus. But two years later

**Man
in the
News**

things were different. Dr. Seaborg was appointed faculty athletic representative and small fry came by the dozens to congratulate him on this recognition.

"You really have to do something to win the respect of these kids," he said afterward.

Now 47 years old, Dr. Seaborg has managed to keep doing something. Today in Washington he received the Enrico Fermi Award—\$50,000, a citation and a medal. Asked what he planned to do with the money, he replied:

"I have six children, the last of which was born a month ago today. This will offer great opportunities for spending it."

The lanky, 6-foot-3 chancellor of the Berkeley campus owns a large lot next to his home. He has converted it into a neighborhood playground, with a baseball diamond and a tennis court that doubles as a basketball and volleyball court.

He Joins His Boys

Here he joins his own boys and their friends—when he is not in the chancellor's office, or wearing the hat of associate director of the Radiation Laboratory, or guiding a group of graduate students under his care, or reporting a scientific discovery, or collecting an award.

Dr. Seaborg obviously does not fit the public image of a scientist. His Swedish forebears were master machinists for three generations and he speaks simply and directly.

He was born in the mining town of Ishpeming, Mich., and moved to California as a child. He was class valedictorian at David Starr Jordan High School in South Gate, where he was too light to make the first team in football, but where a teacher inspired him to study physics and chemistry.



From football to plutonium

The depression years were tough for him at the University of California at Los Angeles. Transferring to Berkeley for graduate work, he had earned a doctorate in chemistry by 1937.

Dr. Seaborg's role as discoverer or co-discoverer of such elements as plutonium, important in energy development as well as an atomic bomb ingredient, has been spectacular. He and his associates, either during war work at the University of Chicago or in post-war research here, have also turned up americium, curium, berkelium, californium, einsteinium, fermium and others.

Their discovery of the fissionable isotope, uranium 233, made from thorium, pointed the way to potential use of thorium in atomic power.

In June, 1942, while assigned to Chicago with the Manhattan atom bomb project, Dr. Seaborg took a day off during a trip back to Berkeley and married Helen L. Griggs, then secretary to the late Dr. Ernest O. Lawrence, the Nobel laureate.

Finds Golf Relaxing

They planned a family of six children. Dianne Karole was born last month to complete the family of four boys and two girls. Dr. Seaborg now enjoys an occasional add-

SEABORG RECEIVES THE FERMI AWARD

Plutonium Discoverer Hopes
Future Use Will Be for
'Good of Mankind'

Special to The New York Times.

WASHINGTON, Dec. 2—Dr. Glenn T. Seaborg, a discoverer of the plutonium, used in atomic bombs, received the \$50,000 Enrico Fermi Award today for his leadership in the development of nuclear chemistry and atomic energy.

The award was presented to Dr. Seaborg, now chancellor of the University of California, by John A. McCone, chairman of the Atomic Energy Commission, and Dr. Warren C. Johnson, chairman of the commission's general advisory committee, in a ceremony at the commission's headquarters in Germantown, Md.

In accepting the highest atomic award conferred by the Government, Dr. Seaborg expressed the "devout and prayerful hope that the future will find the application of plutonium devoted to the good of mankind."

Use for Power Stressed

Noting that "this interesting man-made element holds possibilities both for good and evil that stagger the imagination," he said he believed it "quite possible to confine its application to beneficial uses, particularly the generation of large quantities of industrial power which all parts of the world will need in the future."

ed duty, giving the baby her bottle.

He finds golf relaxing, he says, when associates do not talk business. He says it is a big day for him when he breaks ninety.

He came up recently with a scientific improvement in his golf game. He had been hitting the ball short of the hole in putting. Then he began to sink his putts.

"You know," he said to a companion. "I figured it out. I've been hitting the ball too easy—not hard enough."

"So what did you do about it, Glenn?" the associate asked.

"I hit it harder," he replied. "Well," the friend said. "A fellow who can do that might win a Nobel Prize some day."

Dr. Seaborg also stressed "the critical importance of education to the future of our country."

Dr. Seaborg was also honored for his leadership in discovery of several other elements that do not exist naturally on earth. Since the end of World War II, he and his colleagues at Berkeley have succeeded in creating and identifying seven elements heavier than plutonium.

The Enrico Fermi award was established by Congress in 1954 in honor of the Italian-born scientist who seventeen years ago today achieved the first self-sustaining nuclear reaction.

The award has been presented to the late Dr. John von Neumann, who served on the Atomic Energy Commission; the late Dr. Ernest O. Lawrence of the University of California, and Dr. Eugene Wigner of Princeton University.

Mr. McCone announced today that a new award, honoring "especially meritorious contributions" to atomic energy, had been established as a memorial to Dr. Lawrence, who died in 1958. The \$25,000 award, which can be shared by up to five persons, is designed in particular to honor the contributions of younger scientists.

DEC 3 1959

Seaborg Gets Fermi Award

WASHINGTON, Dec. 2 (AP). —The man who discovered the atomic bomb element plutonium today accepted an award for work in nuclear chemistry. Expressed a "devout and prayerful hope that the future will find the application of plutonium devoted to the good of mankind."

Dr. Glenn T. Seaborg, Chancellor of the University of California, received the Enrico Fermi Award—\$50,000, a medal and a citation—at ceremonies at Atomic Energy Commission headquarters.

00849

PEOPLE

Fermi Award to Seaborg



Wide World Photo

Dr. Glenn T. Seaborg, chancellor of the University of California, Nobel Prize winner, and discoverer of several elements and isotopes, displays citation, check, and medal given to him by the Atomic Energy Commission. The Enrico Fermi Award of \$50,000 recognizes his outstanding work in nuclear chemistry and atomic energy. His pioneering research in nuclear fission in the group led by the late Enrico Fermi, led to the first self-sustaining nuclear reaction 17 years ago. This marked the beginning of the nuclear age.

SEABORG AND GLASER CHOSEN FOR HONORS

Two more honors came to the Laboratory this past month.

Chancellor Glenn Seaborg (Associate Director) has been named a fellow of the New York Academy of Sciences. A pioneer in the development of nuclear chemistry, Dr. Seaborg is a Nobel prize winner and recently received the Atomic Energy Commission's Fermi Award. (See the December, 1959, issue of THE MAGNET.)

Dr. Donald Glaser (Physics Research Group Leader) has been awarded the American Physical Society Prize of \$2500 for his invention of the bubble chamber. The prize, presented to Dr. Glaser at the December meeting of the society in Pasadena, is a new one, sponsored by the Hughes Aircraft Company.

Dr. Glaser, a graduate of Case Institute of Technology (B.S., 1946), received his Ph.D. at the California Institute of Technology in 1950. He was a member of the Physics Department teaching staff of the University of Michigan from 1949 to 1959, and also worked for several summers as a consultant at our Laboratory. In September of 1959 Dr. Glaser joined the University of California as a member of the Laboratory research staff and as Professor in the Physics Department.

Dr. Glaser invented the bubble chamber in 1953. A valuable instrument for the detection and study of nuclear particles, it led the way to development of a great variety of bubble chambers, including the world's largest, the 72-inch hydrogen bubble chamber at the Berkeley Laboratory.

What Worries Nobel Scientists Most About America's Future?

SAN FRANCISCO CHRONICLE Pictorial Living

Sunday, February 7, 1960

The Swedish inventor of dynamite, Alfred Bernhard Nobel, a life-long bachelor, recluse and pessimist, died in 1896. He left behind a curious will designating the bulk of his estate to be invested in safe securities and set aside in a fund, the interest on which was to be distributed, according to his wishes, "in the form of prizes to those who, during the preceding year, shall have conferred the greatest benefit on Mankind."

Considering Nobel's accomplishments—he also developed a blasting gelatin and several explosive detonators—the remarkable legacy would appear to be an enigma. Having amassed a fortune from the development of destructive weapons, Nobel was sceptical about abolishing war. "My factories," he once wrote to a friend who had invited him to participate in a peace congress, "may make an end of war sooner than your congresses. The day when two army corps can annihilate each other in one second, all civilized nations, if it is to be hoped, will recoil from war and discharge their troops."

Despite this credo, Nobel was an idealist and, on December 10, 1901, the anniversary of Nobel's death, the first awards were bestowed in Stockholm on deserving candidates in five categories: physics, chemistry, medicine, literature and peace.

After 60 years of Nobel Prizes, awarded without regard to nationality, 64 Americans have been honored. Of these, 19 were Californians and 16 resided in the Bay area. The local winners took nine prizes for physics, four for medicine and three for chemistry.

A Nobel laureate receives a gold medal, a sum currently worth \$42,000, and a diploma bearing a citation of his achievements. For the scientists, the diploma lists specific discoveries, as in the case of Berkeley's Wendell M. Stanley and John Howard Northrop, who shared the 1946 chemistry prize, "for their preparations of enzymes and virus proteins in a pure form."

The literature award is granted "for the most outstanding work of an idealistic tendency," while the peace prize, bestowed on such statesmen as Theodore Roosevelt, Cordell Hull and George Marshall, was specified by Nobel—strangely enough—to be given "to the person who shall have done the most or the best work for fraternity among nations, for the abolition or reduction of standing armies and for the holding and promotion of peace congresses."

In view of the idealism directing the dispersal of Nobel's inheritance, The Examiner's Pictorial Living has asked six local Nobel Prize winners to give their individual ideas on what worries them most about the future of the United States.

"What the world demands of us now is mental and intellectual work."

by Glen T. Seaborg



Dr. Glenn T. Seaborg, now Chancellor of the Berkeley campus of the University of California, shared his Nobel prize in physics with Edward McMillan in 1951, for co-discovery of the element Plutonium.

Our people have a tradition of hard work and pioneering. Our fathers came from the Old World to free themselves of restrictions and to build a better life. They accepted hard work as a necessity in achieving their purposes. Our Nation, therefore, has had an identifiable national purpose: to subdue and use a great land and to hold free institutions inviolable.

I am concerned, however, that we have lost sight, momentarily, of our fundamental principles. In recent decades we have been harvesting the fruit of hard work and ingenuity of the past. The demand for physical labor is no longer so great as it was. With relatively little physical effort, most of us can obtain adequate material satisfactions.

But the need for hard work is not over. The kind of work we do today is different for a large portion of our people. What the world demands of us now is mental and intellectual work. It requires discipline, concentration and long hours. Large num-

bers of our youngsters who are capable of such work do not undertake it. For a variety of reasons, they take a road that requires less effort but yields as much and sometimes more material rewards. For example, I think a student takes the easy road when he has ability in mathematics or science but takes only as much as is required. We lose as individuals and as a nation when people take the easier road; and I think that in the future the material as well as the spiritual rewards of the tougher road will generally be the best.

What I believe we should do is to take a fresh look at our past, to interpret the attitudes of our forefathers in modern terms. We cannot help but see that we must work hard to preserve, not only our democratic ideals in a competitive world of ideologies, but our luxuries as well. Our toughness must be of the mind and the spirit. We cannot afford to allow these qualities, which I am certain are strong in us, to remain undernourished.

U.C. Seeks Heaviest Elements

**Long-Range Plan
Coordinated With
International Effort**

BERKELEY, March 17 — The start of a long-range program designed to produce research quantities of the heaviest known elements has been revealed by Chancellor Glenn T. Seaborg of the University of California.

Dr. Seaborg, a Nobel Laureate in chemistry, proposed that the project be expanded into an international effort by many nations, including Russia.

Dr. Seaborg discussed the program in Carlisle, Pa., last night upon receipt of Dickinson College's Priestley Memorial Award for "contributions to the welfare of mankind through nuclear chemistry."

INITIAL VENTURE

Starting material of the long-range program described by Seaborg is plutonium, element 94, which was co-discovered by the U.C. chancellor.

The plutonium will be converted by transmutation into heavier elements.

Some 12 kilograms (about a pint) of the element has been placed in a reactor at the Savannah River, S.C., facility of the Atomic Energy Commission and is now being bombarded by neutrons.

In two or three years, this material will yield about three ounces of curium and other heavy elements.

HIGHER OUTPUT

"By that time," Dr. Seaborg, said, "we hope to have a high flux neutron reactor. The curium, much more than we have been able to produce before, will be subjected to an extremely high concentration of neutrons.

"At the end of two or three more years we will be able to extract about one milligram of Californium," he added. "Meanwhile, we can start new batches of plutonium through the cycle and have continuous production of heavy elements."

A milligram of Californium, far more than has ever been produced, will be worth millions of dollars.

Part of it would be used in the U.C. Lawrence Radiation Laboratory by Dr. Albert Ghiorso in an attempt to create element 103, now undiscovered, and perhaps even heavier elements.

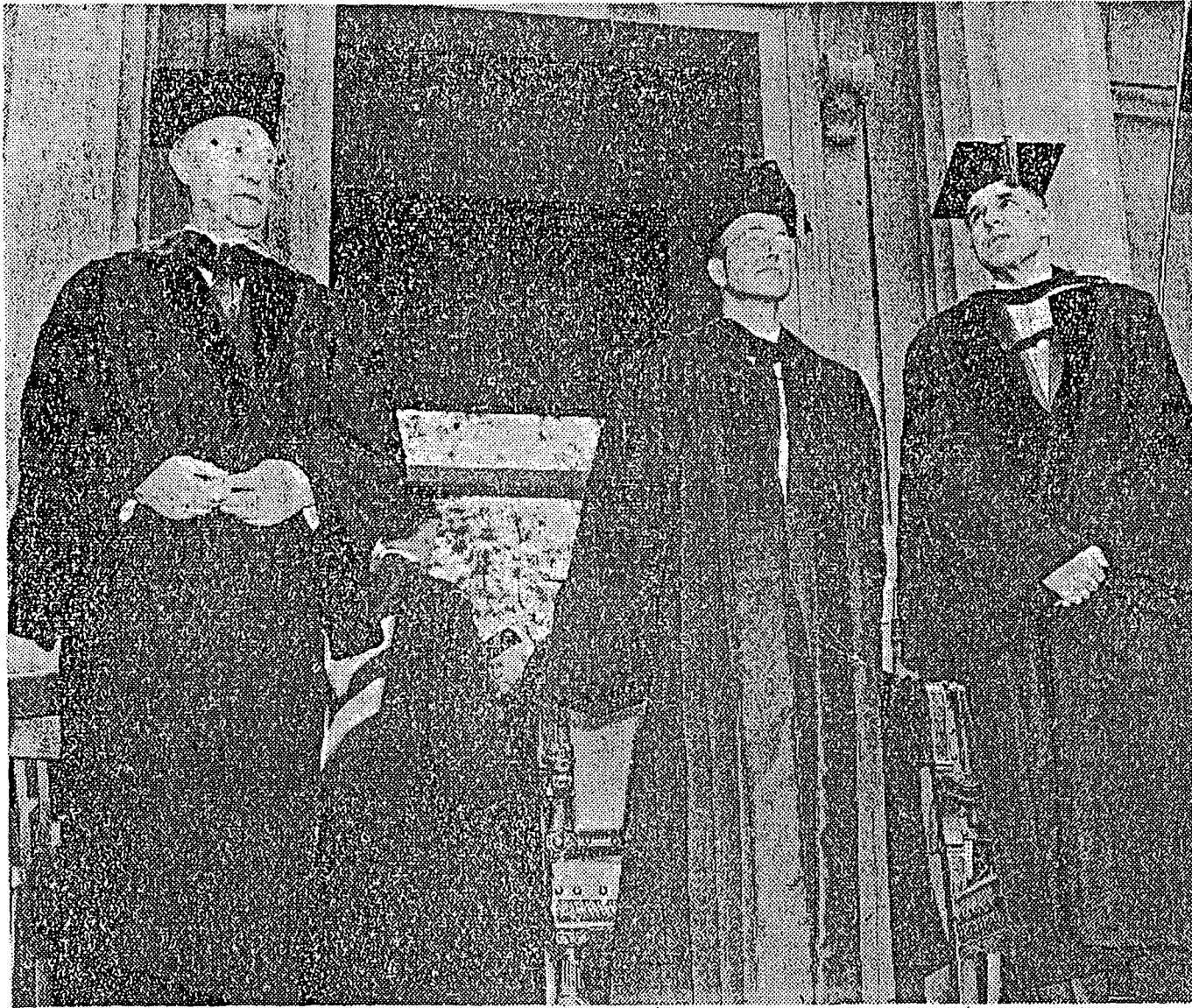
Dr. Seaborg urged that expansion of the program be undertaken through the United Nations International Atomic Energy Agency in Vienna.



Tribune photo

CHARTER DAY VISITOR—West German Chancellor Konrad Adenauer (left) speaks briefly to the crowd of greeters upon his arrival at San Francisco International Airport this morning. Standing with the venerable statesman are Mayor George Christopher of San Francisco (center) and University of California Chancellor Glenn T. Seaborg.

27, 1960
March 22, 1959



Facing capacity crowd of more than 10,000 during Charter Day ceremony in Greek Theater of University of California are, left to right, West German Chancellor Konrad Adenauer, UC President Clark Kerr, and UC Chancellor Glenn T. Seaborg. (More Charter Day pictures on page 9.)

The Daily Californian

MEMBER OF THE COLLEGE DAILIES

Vol. 172

No. 40

Berkeley, California, Tuesday, March 29, 1940

Seaborg to Head Chemistry Program

By LEW K. STANBY

Improved teaching of high school chemistry is the goal of a national program recently undertaken by the University and Harvey Mudd College. The program is under the chairmanship of Chancellor Glenn T. Seaborg.

The project will be financed by a grant from the National Science Foundation, and will be similar to programs now underway in physics, mathematics and biology.

SUPPLEMENTARY

Under the program, known as the Chemical Education Materials Study, textual and experimental materials will be provided to high schools to supplement the normal

curriculum.

"This project presents us with an unprecedented opportunity to advance the teaching of chemistry in this country," Seaborg said. "We can help thousands of teachers by providing them with teaching aids that their school districts cannot afford.

EXPERIMENTS ON FILM

"For example, films of important experiments that cannot otherwise be shown students, for lack of necessary apparatus, can be made available. Many schools that do not now have chemistry classes may be able to initiate them with the aid of our materials."

The Steering Committee of the project, consisting of 17 men prominent in chemistry or education, will meet next week for the first time to plan the program.

In June and July, about 25 chemistry teachers at the university and high school level will meet for an intensive writing conference, to prepare text material and experiments in preliminary form.

AUGUST INTRODUCTION

The material will be introduced to about 30 high school teachers in August. If it is ready for use by them, it will be given to about 15 Bay Area high school and 15 Los Angeles high schools for the 1940-41 academic year.

"We are aiming this program at the student who typically takes high school chemistry just a shade above the average student," Seaborg said. "Gifted students can do additional work through monographs in over 20 lines."

The program will probably last for two or three years, according to George Pimentel, professor of chemistry and assistant director

of the project in charge of textual materials.

"I would like to see us finish in one year," he said, "but I don't think it would be wise. We want to have a year of experience, and then meet next summer to make any necessary revisions."

Seaborg pointed out that universities, especially the smaller ones, will have to gear themselves to start students on a more advanced level.

"The next topic we take up may have to be chemistry courses in colleges," he said.

Pimentel gave two effects which he thought would result from the project in the long run.

"We can give the citizen-in-the-street an increased awareness of the capabilities of science," he said.

"And for the man who will go on into a scientific career, we can give each individual more help in reaching his maximum potential."

Maybe you can't keep a good man down, but that doesn't mean that you can't help him.

THE ATOMIC ARCHEOLOGIST: DR. GLENN T. SEABORG

*This Nobel Laureate Chemist Digs Elements Out of Nature
That Have Never Before Been Seen on Earth*

—SAN FRANCISCO

A CHEMIST with enormous political skill and profound scientific knowledge completed a successful raid on the military's most precious raw material not long ago. He diverted the stuff from the making of bombs to the furtherance of basic research in science.

Plutonium, the fissionable key to our atomic and thermonuclear arsenal, is the raw material. Prying from nature fleeting fossils of the nuclear world: heavy elements never before seen on Earth, and having no presently conceivable practical use, is the purpose of the research. Glenn Theodore Seaborg is the man with the political skill and the knowledge.

Seaborg is a lanky, gregarious Nobel prizewinner. He is a one-time stevedore and harvest hand. He is the Chancellor of the University of California at Berkeley and a member of President Eisenhower's Science Advisory Committee.

Atomic physicists and chemists all over America are now participating in Seaborg's great diversion. A million dollars is going into the first maneuver at Savannah River, South Carolina, this country's H-bomb factory. There scientists are cooking down twelve kilograms of plutonium (enough to fill a pint bottle) in an atomic furnace. In two or three years neutrons flying around inside the furnace will change the plutonium into 100 grams of curium plus equal amount of americium. Then the curium atoms will be cooked in another A-furnace for several more years and each year some of the 100 grams of curium will turn into a bare milligram of californium.

The names are obscure: curium, americium, californium. But Seaborg knows them well. With his co-workers at the University of California's Lawrence Radiation Laboratory, he helped discover them all. They are transuranium elements—heavy substances, more

massive than common uranium, which used to stand at the top of the periodic table of elements. They are intensely radioactive. They may still exist in nature deep inside the hottest exploding stars of the universe, but most of them vanished from Earth without a trace billions of years ago. Their synthetic creation during a brilliant continuing adventure in nuclear research has added immense new knowledge about the finest details of the atom's makeup.

So far science has provoked nature to disgorge just ten transuranium elements, ranging from neptunium (with an atomic number of 93, only one step higher than uranium) to element 102, which is ten steps beyond. Seaborg has calculated what their properties must be, all the way up to element 118. Will science ever find them?

A few, yes. But as the elements get heavier they become more unstable. Like a child's house of cards, they fall apart the instant they are put together. Alpha particles and neutrons fly out of them like corn from a hot popper. The elements degenerate and change in the course of the popping. Hard as it is to heat the popper enough to end up with the heaviest elements, it is harder still to know when they have popped.

Incredibly rapid chemical analysis is required. Planes and helicopters fly fast-decaying samples from atom-smashers and A-furnaces to labs. Ultra-miniature working tools have been designed to handle microscopically small samples. Only indirect identification, through careful study of the radiations emitted and the daughter elements created in the decay process, can be made of those elements yet to be discovered.

Element 101, for example, was discovered by Albert Ghiorso and Seaborg and their team five years ago. It is called mendelevium. It decays by spontaneous fission and has a half-life of less than half an hour. The team brought it into being by firing alpha

particles—the nuclei of helium—into a target of einsteinium. Einsteinium (element number 99) was itself first seen in the fireball of the 1952 H-bomb test at Eniwetok, where it was accidentally picked up by a radio-controlled drone plane that flew through the mushroom cloud.

As for mendelevium, itself, the discovery team found exactly seventeen atoms of it in their atom-smasher's target: a fabulously minute quantity, invisible, intangible, unweighable. That the atoms were there was proved by radiation counters which registered the tiny fission bursts from each mendelevium atom. The exultant discoverers wired the counters to the Radiation Lab's fire alarm system, so the jangle of bells could herald the new discovery—and unnerved the campus firemen.

Mendelevium, 1,000 times more radioactive than uranium, is the next-to-last of the transuranium elements so far discovered. As of now, element 102 is the very last. It was created in 1958 by firing into an isotope of curium (number 96) some carbon ions. Again Seaborg and Ghiorso headed the discovery team. They found forty atoms at a time, and half of those disappeared in three seconds. By spitting out alpha particles, the mendelevium turned into fermium, half of which was gone in thirty minutes. The fermium atoms lived long enough, however, to serve as evidence that element 102 had been there.

What comes after 102? This is where Seaborg's great diversion of plutonium comes in. The californium that eventually will be born as plutonium's descendant is expected to provide the essential building block for element 103 and perhaps others beyond. So all the plutonium Glenn Seaborg persuaded the military to relinquish in the first place will go into the making of new and unknown matter: matter to vanish in a flash, but in the vanishing to deepen man's understanding of his nuclear environment.

IN all this, perhaps, is an insight into Seaborg himself, a man of forty-seven who by his career and his nature is surely to wield a most important influence on American education and political development, to say nothing of science. Seaborg is fascinated by basic knowledge, a pure researcher in an arcane field. But he also can get things done. As an administrator, he has demonstrated ability to handle a team of any size—from a half-dozen scientists in a lab to 100 scientists and technicians in a war-time project producing plutonium, to 8,000 staff and faculty members with enormously disparate interests on a university campus.

Born in the mining town of Ishpeming, Michigan, and reared in south-



—UCLA.

Dr. Glenn T. Seaborg

ern California, Seaborg knew he was headed toward science during high school, and toward nuclear chemistry by his senior year at the University of California at Los Angeles. Like his family of Swedish machinists, he was always a hard worker. He mowed lawns and delivered papers in high school. He worked as a stevedore and as a laboratory assistant for a rubber company to earn money for his first year of college. When the economic depression hit in 1929, he picked apricots in the San Joaquin valley, worked as apprentice to a linotype operator, and finally settled down as a UCLA chemistry lab assistant to pay for the rest of his college career. He made Phi Beta Kappa in his junior year, graduated in 1934, and took his Ph.D. in 1937 at Berkeley.

THREE years later he discovered his first transuranium element. It was plutonium, the most efficient of the nuclear fission fuels because of the number of neutrons it released to carry on a chain reaction. Soon he added to the armament collection uranium 233, which can be produced from the common element thorium. During World War II he helped speed plutonium production techniques at the Manhattan Project's "Metallurgical Laboratory" in Chicago.

After the war Seaborg returned to Berkeley and the Radiation Laboratory with the title of full professor. There were more transuranium elements to seek. In 1951 he shared the Nobel Prize in chemistry with his Berkeley colleague, Edwin M. McMillan. In 1954 he became the Radiation Laboratory's Associate Director under the late Ernest Orlando Lawrence, and four years later the University plucked him from his full-time science work to make him Chancellor of the Berkeley campus. Last year he capped his Nobel Prize with the \$50,000 Enrico Fermi award, the United States Government's highest honor in atomic science.

Today Seaborg manages, a couple of mornings a week, to escape to the Radiation Lab from his more vexatious consideration of educational policy, fraternity hazing problems, professorial vying for department budgets, and even the selection of a football coaching staff.

In a sense, Seaborg is a modern version of Renaissance Man. He supervises a group of graduate chemistry students working for doctorates. He maintains an acute awareness of politics, voting independently and displaying an outlook thoroughly internationalist and liberal. He flies to Washington monthly for meetings of the President's Science Advisory Committee. He served for five years as his university's delegate to the Pacific Coast Football League. He makes speeches by the dozen, stressing the need for increased education and increased science awareness.

Each week-end Seaborg carries briefcases and cardboard cartons filled with working papers to the comfortable redwood home in the suburban town of Lafayette which he and his wife designed for themselves and their six children. At home his life and tastes are simple. He reads a lot. He golfs when he can, breaking ninety occasionally with considerable gusto. He plays baseball, volleyball, and basketball with his children and a pack of neighborhood kids for whom he built a complete playground in his yard. His closest neighbor is Dr. Isidore Perlman, associate director of the Lawrence Radiation Laboratory and a renowned expert on radiation measurements. Perlman and Seaborg are fast friends and popular figures to the Lafayette small fry since they jointly installed a swimming pool on Perlman's property that's open to all comers.

Faculty members say Seaborg is a superb leader, an adroit reconciler of divergent personalities, and a man with an analytical mind that functions calmly regardless of any excitement around him. He is likable, and well-liked.

Physically, Seaborg gives an impression of rugged strength with his solid build towering six feet three inches tall. In his office he seems mostly legs; they extend far in front of him as he relaxes, hands in pockets, in an armchair to talk to visitors. His beetling eyebrows are reminiscent of John L. Lewis, but his slender, tanned face has no trace of pugnacity. He smiles warmly, his voice is deep, and his speech thoughtful.

AS a scientist, Seaborg is deeply concerned over American education today; but it is not a new concern: he has never been a post-Sputnik crier for crash programs.

"If it is true that every man in a democracy need not be an originator of

policy but must be a good judge of it," he says, "then our citizens must be well enough acquainted with the general principles of science to be good judges of policy based upon it, or at least be able to reject spurious policies founded on pseudo-science or nonscience."

SCIENCE education must start early, he believes, and offer far more at higher levels to non-specialists. Science illiteracy today is untenable. But all education must be intensified as well. Specialists are often too little exposed to humanistic culture in today's world of science, he feels. Far more support is needed for humanities faculties.

"Our university has many sources of funds to offer scientists relief from all teaching responsibilities so they can spend a period in uninterrupted creation," he points out, adding, "We should be able to afford the same opportunity for creation and research to scholars in the arts, the humanities, and the social sciences.

"We must extend our efforts to rescue lost talent among women and among minority groups. We must do more research in the development of new educational techniques, not only to get more information into people, but to sharpen each individual's critical sense."

Seaborg is convinced his own profession will be playing a larger and larger role in public affairs. He points to the great fallout debate—inconclusive as it has been up to now—and to the fact that both major political parties are seeking advice from scientists in drafting their 1960 platforms.

SCIENTISTS don't necessarily have to make the final political decisions," he says with a smile. "but at that it might be easier to let a capable scientist learn political reality than to teach a politician science. And I'm not sure it wouldn't be wise to have a few scientists in Congress. They might help, these days."

Above all, as Seaborg reflects on the world around him, he thinks of the continuum that operates in time and the unity that cuts across specialized intellects to unite all intelligence.

"There is beauty in discovery," he said in a speech not long ago. "There is mathematics in music, a kinship of science and poetry in the description of nature, and exquisite form in a molecule. Attempts to place different disciplines in different camps are revealed as artificial in the face of the unity of knowledge. All literate men are sustained by the philosopher, the historian, the political analyst, the economist, the scientist, the poet, the artist, and the musician."

DAVID PERLMAN.



AT CAMPUS DEDICATION—University of California officials gathered at dedication of Kroeber Hall on the weekend. Included were (from left) Chancellor Glenn T. Seaborg, Alfred L. Kroeber, Regent Catherine Hearst, and President Clark Kerr. The \$3,500,000 art and anthropology building was scene of art show. 31

March 1960

15th

\$5.50 A YEAR

April 2, 1960

VOL. 77, NO. 14 PAGES 209-224

SCIENCE NEWS LETTER

®

SCIENCE NEWS LETTER for April 2, 1960

CHEMISTRY

Make Heavy Elements

IN ONE OF the giant atomic reactors at Savannah River, S. C., about a pint, 12 kilograms, of plutonium, fission bomb element, is being bombarded with neutrons.

Some years hence chemists will extract the world's largest quantity of the extremely rare man-made chemical element californium, number 98, a matter of only a milligram, about one thirty-thousandth of an ounce.

This will be a major step toward understanding and possibly using the heaviest known elements that can be converted in a step by step process of successive transmutation into heavier elements.

This promises also to lead to the creation of still-undiscovered element 103 and still heavier elements.

Dr. Glenn T. Seaborg, Nobelist, discoverer of many of the transuranium elements of the atomic age, who is now chancellor of the University of California, Berkeley, described the new long-range national program to produce research quantities of synthetic elements 97, 98 and 99 in receiving the Dickinson College 1960 Priestly Memorial Award.

Dr. Seaborg proposed at the same time that the new program be expanded into an international effort at the U. N.'s International Atomic Energy Agency in Vienna, with scientists from other nations, including Russia, to participate.

About 100 grams, three ounces, of curium, element 96, will be produced by 1963 in the first step, along with other heavy elements.

By that time, the University of California is expected to have a high flux neutron reactor, part of the current proposed program

of the Atomic Energy Commission. The curium, much more than ever produced before, will be subjected to the extremely high concentration of neutrons that will be created in the new reactor. At the end of two or three more years further transmutations will have occurred, and there will be extracted about a milligram of californium.

A milligram of californium will be many times more than scientists have ever been able to assemble. It will be a treasure worth millions of dollars and have intangible value beyond price. Part of it will be used, for example, as a target material in atom-smashers like the Berkeley HILAC, in which Dr. Albert Ghiorso, of the Lawrence Radiation Laboratory, would attempt to create element 103.

Out of the discovery of such new elements and chemical and other studies of the properties of the extremely heavy nuclei will come refinements of knowledge of the heavy atomic nuclei the value of which cannot be calculated.

In proposing that the program be made international, Dr. Seaborg said: "The program meets all the criteria for international development. There is nothing more basic or more international than the chemical elements. They are the elementary stuff of the universe. These heavy ones have no military value. Making the heavy ones is extremely expensive. If we can include scientists from other countries in the program, and provide them with some of the materials we will make a valuable contribution to the expansion of human knowledge and international understanding."

Science News Letter, April 2, 1960

00861

(Release Immediately) 4/5/60

Seaborg Describes Program To Produce Heavy Elements

BERKELEY.—A long-range national program to produce research quantities of the heaviest of the known elements, the synthetic elements 97, 98 and 99, was described in detail recently by Glenn T. Seaborg, distinguished nuclear scientist, Nobel Laureate and Chancellor of the University of California, Berkeley.

Seaborg proposed at the same time that the new program be expanded into an international effort at the U.N.'s International Atomic Energy Agency in Vienna, with scientists from other nations, including Russia, to participate.

Seaborg spoke in Carlisle, Pa. where he received Dickinson College's 1960 Priestley Memorial Award for his "contributions to the welfare of mankind through nuclear chemistry."

The scientist said the program is a long-range "bootstrap" operation, which he formulated several years ago. Recently, after approval of the project by the Atomic Energy Commission, some 12 kilograms (about a pint) of plutonium was put in a reactor at the Savannah River, South Carolina, facility of the A.E.C. In two or three years, the transmutations that will have occurred will yield about 100 grams (3 ounces) of curium, plus other heavy elements.

"By that time," Seaborg said, "we hope we will have a high flux neutron reactor. Such a reactor is a part of the current proposed program of the Atomic Energy Commission. The curium, much more than we have been able to produce before, will be subjected to the extremely high concentration of neutrons that will be created in the new reactor. At the end of two or three more years further transmutations will have occurred, and we will be able to extract about a milligram of californium. We can start new batches of plutonium through the cycle; in this way there can be continuous production of the heavy elements."

A milligram of californium, while it is only one thirty thousandths of an ounce, will be many times more than scientists have ever been able to assemble. It will be a treasure worth millions of dollars and have intangible value beyond price, Seaborg said.

Science in the news

Californium to Order

One thirty thousandth of an ounce of one of the earth's rarest elements, californium, will be available to chemists in about three years.

This man-made element, atomic number 98, is being prepared in one of the giant reactors at Savannah River, S. C.

Within the reactor 12 kilograms (a pint) of plutonium, the fission bomb element, are being bombarded with neutrons. This will produce one milligram of californium as an end product.

This quantity of californium will enable chemists to study the nature and use of this rare element, created by the successive transmutation of other elements.

Dr. Glenn T. Seaborg, 1951 Nobel Prize winner in chemistry and discoverer of many of the transuranium elements of the atomic age, is involved in a new long-range national program. Objective of the program: to produce research quantities of synthetic elements 97 (berkelium), 98 (californium), and 99 (einsteinium).

About 100 grams (three ounces) of curium, element 96, will be produced by 1963, along with other heavy elements, in the first step of transmutation. The curium will then be subjected to an extremely high concentration of neutrons. At the end of two or three more years, further transmutations will have occurred, creating about a milligram of californium.

A milligram of californium will be a treasure worth millions of dollars and have intangible value beyond price. Part of it will be used, for example, as target material for atom-smashers in which scientists will attempt to create elements beyond atomic number 103.

Out of the discovery of such new elements, and studies of their extremely heavy nuclei, will come greater knowledge of the heavy chemical elements.

Education Crisis Solution Offered

Solution of American education problems must come from the local level as is now being attempted by Oakland's Public Advisory Council on Education, Dr. Glenn Seaborg declared today.

Speaking at a kickoff luncheon in the Hotel Claremont, the University of California chancellor told PACE members their "performance in solving or in not solving the educational crisis in our country will be a measure of our success in remaining a world power.

"Your educational problems in Oakland are not going to be solved in Washington, D.C., nor in the halls and laboratories of great universities. Your laboratory, the only place where effective action can be taken, consists of your own students, your teachers, the school administration and your own local community."

SPECIAL CONSULTANT

Dr. Seaborg who is acting as special consultant to the sixty-man citizens committee or schools, said gathering and evaluating basic information would be the first order of business. Are teachers and administrators well qualified and adequately paid? Is the curriculum sound? Are students motivated and challenged to do their best work and are they being guided into the proper fields of study?

The basic approach was further emphasized by Henry J. Kaiser Jr., PACE chairman, who announced the first study will be a five-pronged examination of Oakland's 62 elementary schools.

"Like every good builder," Kaiser said, "we feel it is necessary to approach school problems in Oakland from the foundation up. This will not preclude parallel studies of school problems as they occur in the upper grades. Rather the focus will be on the elementary years while we strive to keep the total school picture in mind."

Kaiser said the study will cover curriculum, plants and operations, personnel, com-

munity relations and finance, and will be completed by May, 1961.

He re-emphasized that PACE is a fact-finding, not a fault-finding committee and that it will be expanded to every neighborhood in Oakland as work progresses.

First task is to find where the system now stands, what resources are available and what the goals are.

"Our ultimate purpose, of course, in representing the people of this community is to make certain that the quality of education in Oakland is of the very finest," Kaiser said.

AMERICA'S NEED

Dr. Seaborg told the 50 civic and business leaders at the luncheon that America's tremendous need for trained people made it "imperative" that any deficiencies in education be corrected.

"The general public must become more aware of the ever increasing importance of knowledge," he said.



PACE SETTERS—Dr. Glenn T. Seaborg (left), consultant for Oakland's Public Advisory Council on Education, and PACE general chairman Henry J. Kaiser Jr. were main speakers at today's kickoff luncheon of study group.

"People must be jarred out of the complacency that America will always lead the world in science and in commercial productivity, and that our standard of living and national security are assured by our society and economic system as they stand. In the field of education we need to start and to sustain those measures which will initiate students, parents and the general public to place good school programs, good teaching and sustained and rigorous study high among the things they value."

April 20, 1960

Face Future Together—

The Community and The University



By GLENN T. SEABORG
Chancellor, University of California, Berkeley

I am pleased to respond to the request of the editor of the Berkeley Daily Gazette to discuss community relations and the future. A good beginning is a mental image of the view from our familiar landmark, the Campanile. I am struck by two things: first, the beauty of the total setting of the University community in an environment of hills, water, bridges and cities; second: the unity of the campus and the city which makes Berkeley one of the true university towns.

This unity began in the earliest days. The Berkeley area was an almost uninhabited, tree-dotted plain back in the 1860's. Then the University came, the area was settled, and the city founded. The city and the center of learning grew up together. Today Berkeley is an enterprising community of more than 120,000 people. The University expanded, too, from 40 students and 10 professors to some 20,000 students and faculty and staff numbering about 10,000.

MUTUAL RESPECT

This expansion hardly could have been achieved without understanding, good will and mutual respect between the University and the city. Much of this understanding comes about through the natural play of social forces. University people, for example, take their civic duties seriously, and they take part in important and varied ways in the city's affairs. Berkeley citizens, for their part, participate very actively in the life of the University, in its cultural events and in its many services. In these relationships there is continuing interpretation of the University to the community and of the community to the University. There are, too, more formal means for communication; for example, the liaison committee, consisting of Berkeley city officials and University representatives, which meets regularly to solve mutual problems. This committee has been especially helpful in bringing about mutual understanding of difficult problems involved in the necessary expansion of the University.

COMPENSATIONS

However, we cannot hope that in any marriage—and the union of the University and the city is a community marriage—problems can be banished. We recognize that our destinies are inextricably bound together; yet misunderstandings will arise from time to time. There is, for example, a question which has occurred—and will occur again—in the minds of local taxpayers: Is the city adequately compensated for the University's constitutional exemption from property taxes? All publicly owned institutions in California are prohibited from paying such taxes, and bearing in this way a part of the cost of city government and services. In answer to this question, state officials and others maintain that a city in which a state university is located is more than compensated for incidental expense by the benefits it receives in terms of income, employment, cultural, educational and recreational opportunities, special services and higher property values.

While the matter of local taxes is out of our hands, we in the University, working with Berkeley city officials, have sought ways of paying for specific services where there seems to be particular justification. Just recently we obtained permission to pay, and began paying, for sewage services to the University. My colleagues and I were delighted to be able to do this.

COMMUNITY BENEFITS

Undoubtedly, the benefits that accrue from the University's presence are far more important than any cash reimbursements we can ever pay under state law and policy. The University has built great prestige, and this has given to Berkeley, without cost, a world reputation as a leading seat of learning and culture. The University is the city's largest employer. Its payroll, a large factor in the economies of Berkeley and surrounding communities, now runs \$60,000,000 for the campus, including the Radiation Laboratory.

Cultural events of a caliber, variety and profusion unknown to most cities are a continuing part of our common life. The University attracts tens of thousands of people to Berkeley each year: students from every county in the state; alumni, who call Berkeley their second home and who come back for athletic contests and other University events; business and professional people and scholars who come to the campus to attend institutes, professional society meetings, conferences, etc.; and tourists, to whom Berkeley is one of the major attractions of the Bay area. An example of a recent addition to the Berkeley facilities that has already begun to attract busloads of visitors from afar is the new museum in Kroeber Hall in which some of the world's greatest anthropological collections are being shown. In the future, the Lawrence Hall of Science will offer to Berkeley youngsters and to visitors alike facilities for learning that will be unique. Every Berkeleyan, too, has close at hand many services, such as informational materials from Agricultural Extension on gardening, adult classes in a wide range of courses offered by University Extension, etc.

FACING THE FUTURE

As we look toward the beginning of the second century of our community marriage, the city and the University together face a new period of growth and development. The large student populations are about to descend upon us and, like every other public institution of higher learning in the state, we must increase our enrollments. At Berkeley we are planning for a maximum of 27,500 students. The corresponding increment—about one-third of our present student population—is large, yet modest in comparison to those at many other institutions. The University will be subject to strains which inevitably will be reflected in campus-city relations.

Neither the University nor the city can stand still. A challenging, rapidly changing time awaits us. I am confident that we shall face it together, and that, with good will, mutual respect and an understanding spirit we shall always find constructive means of dealing with any difficulties that may arise.

ROTC Decision Not Seen

DAILY CALIFORNIAN

October 13, 1960

Chancellor Glenn T. Seaborg does not expect the Board of Regents to decide the voluntary versus compulsory ROTC question at its meeting tomorrow.

President Clark Kerr, who is recovering from a virus infection, will not be at the meeting, Seaborg said. The Chancellor does not think the Regents will vote on ROTC in Kerr's absence.

Kerr has already declared that he "expects" the Regents to reach a decision this fall, but refused to predict what the decision will be.

Seaborg has also declined comment on the final outcome. Seaborg said it would be "indiscreet" or him to try to forecast the Regents' actions.

Three of the Regents have commented on the controversy.

Regent Donald H. McLaughlin, when asked if he expects a decision soon, said "All the facts are in." McLaughlin expressed a "hope for prompt action." He would not predict the vote, but said, "It's not going to a unanimous decision."

One Regent, who wished to remain unidentified, said, "I think it should be voluntary," and said he thinks the rest of the Board will agree.

"I think it could have been settled at the meeting a month ago," said Regent Howard C. Naffziger. Asked why the vote was not taken at the Sept. meeting, he replied, "I think it was simple procrastination."

Many people expected the Regents to resolve the controversy at their April meeting here. At that session they listened to arguments for and against a voluntary program from student presidents from several of the University campuses.

They then tabled the issue in order to wait for the results of a conference held early this summer at Ohio State University with representatives from 40 other universities and representatives from the United States Department of Defense. They were also awaiting the report of a faculty committee established to investigate the status of the program.

Speculation then arose that the decision might come in July, but the Regents did not discuss the matter at that meeting.

Superintendent's Bulletin



C. H. WENNERBERG
SUPERINTENDENT
1414 WALNUT STREET
BERKELEY 9, CALIFORNIA

BERKELEY PUBLIC SCHOOLS

October 21, 1960

CHANCELLOR SEABORG ON EXPERIMENTAL COURSES IN CHEMISTRY

"High school students exposed to two new, experimental courses in chemistry will soon be graduating with a better understanding of chemistry than students in many colleges receive after a year of chemistry at the collegiate level," said Dr. Glenn T. Seaborg, Chancellor of the University of California, in a recent talk, given at the dedication of the new American Chemical Society Headquarters Building in Washington, D.C.

Fourteen secondary teachers in the Bay Area and eight in Los Angeles are now testing a new experimental high school Chemistry course which was developed in the Chemical Education Materials Study under Chancellor Seaborg's general chairmanship. This modernized course eliminates a great deal of the older, largely factual and descriptive material taught in traditional high school chemistry. Instead, the teaching of scientific principles, for example atomic and molecular structure, is stressed.

"The evidence is that high school students actually can absorb subjects we once hesitated to give first year college students," Chancellor Seaborg said. "Moreover, the student does not need the older material. As the course is widely adopted, I believe chemical education and, ultimately, chemical research in this country will be greatly advanced.

"On the basis of the trial experience in the Bay Area and in Los Angeles," said Dr. Seaborg, "there will be an intensive work session at the beginning of next summer to revise the textual ma-

terial. Training institutes to prepare high school teachers will also be held. The revised course then will be used in the academic year 1961-62 in eight geographical areas centered around New York City, Philadelphia, North Florida, Indianapolis, Minneapolis, Seattle, Los Angeles and San Francisco."

Chancellor Seaborg cited a second experimental high school chemistry course, known as the Chemical Bond Approach, as another promising indication of future improvement in chemical training.

"If this action (in improving high school teaching of chemistry) is also accompanied by similar changes in the mathematical, physics and biology program," said Dr. Seaborg, "we shall experience a remarkable strengthening of secondary education in this country."

The Bay Area participants in the Chemical Education Materials Study include: Harry E. Choulett, Berkeley High School; Mrs. Ella Ballou, Technical High School, Oakland; Robert Campbell, Miramonte High School, Orinda; Miss Frances Dealtry, Lowell High, S.F.; Robert E. Etcheverry, El Cerrito High; Miss Mildred Johnson, Abraham Lincoln High, S.F.; Laurence S. Martens, Oakland City College; Miss Margaret Nicholson, Acalanes Union High, Lafayette; Clyde E. Parrish, Cubberly High School, Palo Alto; Eugene Roberts, Polytechnic High, S.F.; Harley H. Sorenson, San Ramon Valley Union High, Danville; and Robert Telefsen, Napa High School.

Berkeley, California, Monday, November 28, 1960

For Better Education, Science...

Savants Urge Federal Spending

A new and vastly increased role for the Federal Government in its support of higher education and science was called for in a White House report last week.

The report was drafted by a panel of eminent scientists, headed by Glenn T. Seaborg, Chancellor of this campus and Nobel prize-winning nuclear chemist.

In the report which will have enormous impact on universities throughout California, President Eisenhower's Science Advisory called for down-the-line Federal appropriations to finance new laboratories, student fellowships, and higher faculty salaries.

Seaborg said Saturday, "This report has already significant implications for the future of higher education.

"It recognizes the need for integrated support of science by the Federal government — not just support of research, but support of graduate education at the same time."

RECENT TREND

The panel of scientists noted that an alarming trend has set in since World War II.

The government is paying for specific research projects, they said, and neglecting the training of new scientists. Universities, in turn, are freeing a favored few in their faculties to do research alone, while the burden of teaching increases on other, underpaid professors.

"We need more men doing more things, with more support in more places," the report said. "If this country is to safeguard its freedom and harvest the great opportunities of the next generation of science, the level of its scientific investment must be multiplied and multiplied again."

ROLE OF UNIVERSITIES

The place for multiplication is in the universities, the report said, an dtheir function "is one of absolutely critical importance to the national welfare."

The number of major universities doing "generally excellent work in basic research and graduate education" must double from 20 to 40 in the next 15 years, the report said.

tion and wiser Federal spending. **MORE FELLOWSHIPS, GRANTS**

As to the support of students, the report declared that "in graduate education the training of scientists involves research, and the strength of scientific research grows out of research training in institutions of higher education.

For this reason, the White House report urged Federal fellowships for "truly promising candidates," and a program of grants

to young scientists in training beyond their doctorate degrees.

Other members of the University faculty on the panel besides Seaborg were William B. Fretter, professor of physics, and Roger Revelle, director of Scripps Institute of Oceanography.

The document issued by the President's science advisors will be calling for implementation when the White House receives its new occupant next year.



CHANCELLOR GLENN T. SEABORG: head of Science Advisory Committee.

At undergraduate colleges, too, better faculty salaries, better facilities, increased time for research and modernization of science curricula are badly needed, the scientists said.

Again and again, the White House science advisors stressed in their report that the research must be accompanied by the training of new scientists.

They urged universities to stop fearing that Federal grants for salary of buildings or fellowships might mean Federal control. They

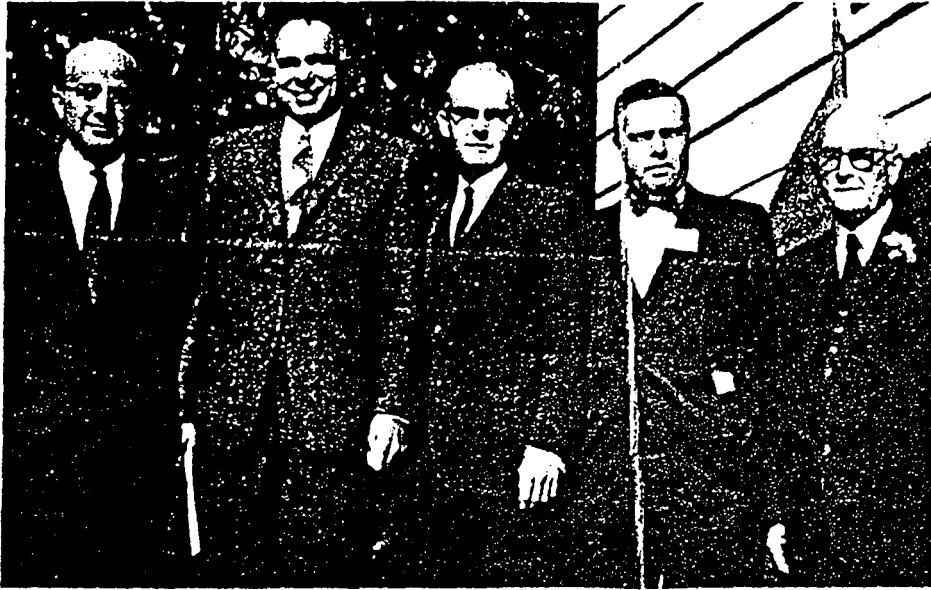
urged government agencies to broaden research support into long-term, flexible and unrestricted grants.

The scientists urged Federal agencies to budget for salary support of senior faculty members although they did note acidly that "the characteristic error of most universities is to pay professors too little and to load them unwisely with specific teaching assignments."

The solution here, they said, lies in bold university administra-

UNIVERSITY BULLETIN

December 5, 1960



HOSPITAL ADDITION DEDICATED—Among those on hand for the recent dedication of the new five-story S. H. Cowell Foundation Memorial Wing on the Berkeley campus, in addition to The Regents, were (left to right) University President Clark Kerr, Chancellor Glenn T. Seaborg, Warren L. Bostick, M.D., President-Elect of the California Medical Association and Professor of Pathology, San Francisco Medical School; Henry B. Bruyn, M.D., Director of the Student Health Service and Associate Professor of Medicine and Pediatrics, and Max Thelen, President of the S. H. Cowell Foundation. Construction of the new facility, made possible by a \$1,500,000 grant of the S. H. Cowell Foundation, doubles the previous student health facilities at Cowell Hospital, built in 1930, for a student body of 10,000. The expanded facility will result in one of the most complete student health services since the founding of student health services at Amherst in 1859.

December 16, 1960

DR. SEABORG SPEAKER

Nuclear Fission Labeled Energy Source of Future

Dr. Glenn T. Seaborg, who is renowned as a scientist, public citizen, and educational administrator directed his attention to his academic field yesterday when he delivered a university lecture on "Energy Sources of the Future" at the University of California at Santa Barbara.

The visiting lecturer, a Nobel prize winner in chemistry nine years ago and now chancellor of the Berkeley campus of the University of California, outlined to a responsive and inquiring audience the sources of energy that we are presently using. He then focused his discussion on those energy sources which will become increasingly important to mankind in the future.

POWER NEEDS DOUBLE

Chancellor Seaborg brought out initially that with a population increase in the U.S. of 1½ per cent per year, electric power needs will double every 10 years. He also stressed the importance of developing energy sources in underdeveloped countries.

Energy that we now use, Dr. Seaborg said, comes mainly from fossil fuels—coal, wood, petroleum, and natural gases. Although the per capita use of this type of energy in the U.S. is several times that of the European countries, the lecturer went on, we have enough of this type of energy to last us

well into the future. However, the cost of fossil fuels continues to rise tremendously and will probably double in the next 50 years.

URANIUM KEY

This prohibitive cost, Dr. Seaborg said, will cause us to turn to another source of energy, namely, the nuclear energy fission source. This will be used predominantly to get electric power. Uranium is the key element in this source. The uranium source uses directly the energy locked up in the nucleus of the atom, the lecturer explained. He also said that the amount of energy residing in the nucleus of an atom is comparatively very large.

Illustrating with a pound block of natural uranium, the chemist explained that "if all the nuclei in this pound of uranium were to undergo the 'nuclear fission reaction' an amount of heat energy equivalent to the burning of about 1500 tons of coal would be available." This would be enough energy to keep the needs of a city like Santa Barbara going on the basis of just a pound or so a day, Chancellor Seaborg further illustrated.

2 NATIONS SHORT

Turning to the question of the availability of sources of energy in various parts of the world, the lecturer said that

while in countries like the U.S., Canada, Western Germany and the USSR there is "a sufficient supply of fossil fuels and hydro-electric power to last another 20 years" this is not the case in the United Kingdom and Japan. These two countries must turn to the nuclear fission source of energy in spite of prohibitive costs and difficulties of development of nuclear reactors.

A potential third source of energy mentioned by Dr. Seaborg was the "fusion" source. However, basic laboratory problems in connection with this source have not as yet been solved. The use of "solar power" as a source of energy was also touched upon by the lecturer but he said that scientists would be struggling with the problems of harnessing solar power for some years to come.

Chancellor Seaborg was introduced by Dr. A. Russell Buchanan, vice chancellor for undergraduate affairs at UCSB. The final university lecture of the fall semester will be given after the Christmas recess, on Jan. 3 at 4 p.m. in the classroom building lecture hall. Carl B. Zytowski, associate professor of music will talk at that time on the subject, "Dr. Burney Revisits."

PHYSICS

Element 98 Prepared

The first pure compound of the man-made element californium has been prepared by University of California scientists with samples weighing about ten-millionth of a gram.

➤ THE FIRST PURE compounds of the man-made element californium, No. 98, have been prepared by scientists at the Lawrence Radiation Laboratory of the University of California, Berkeley, where this element was first made.

Preparation and identification of the compounds was carried out by Drs. Burris B. Cunningham and James C. Wallmann. Three separate californium compounds—californium trichloride, californium oxychloride and californium oxide—were prepared by treatment of the element with hydrochloric acid and steam at high temperatures.

Dr. Glenn T. Seaborg, Nobel Prize-winning chancellor of the University of California at Berkeley, described the work in a distinguished lecturer's address at the winter meeting of the American Nuclear Society.

Dr. Seaborg said the feat of carrying out identifiable chemical reactions with such minute quantities of material—samples weighing about a ten-millionth of a gram—was accomplished as a result of the recent perfection, by Dr. Cunningham and his colleagues, of techniques for working on the "submicrogram" scale.

Californium is one of the "dinosaurs" of matter—an element that may have been present in the beginnings of the earth but soon disappeared through radioactive decay. The element was first fabricated with the use of the atom smashers by University of California scientists.

Dr. Seaborg also stated that a neutron irradiation program now in progress at the Materials Testing Reactor at Arco, Idaho, will yield about a ten-millionth of a gram of einsteinium (element 99) early next year. This quantity, he said, might be enough to permit the isolation of einsteinium for the first time.

Einsteinium is likely to be the only remaining transuranium element that can be isolated in visible amounts, because of the increasingly short lifetimes of the heaviest synthetic elements. Visible quantities of berkelium and californium (elements 97 and 98) were first isolated two years ago by Dr. Cunningham and Dr. Stanley G. Thompson at the Lawrence Radiation Laboratory.

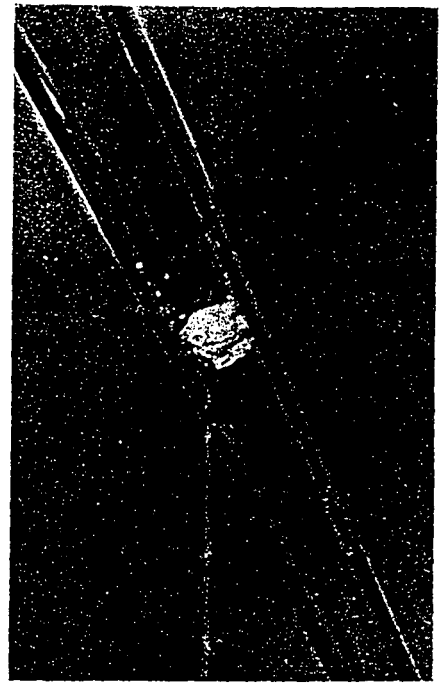
Although elements beyond the presently known 102 will undoubtedly be discovered, Dr. Seaborg said, it should be possible to produce and detect not more than an additional half dozen or so.

The best chance of success, he said, lies in the firing of heavy ions into targets of high atomic number. The small number of atoms of new elements produced, coupled with their extremely rapid decay, will soon require development of new methods of identification.

Dr. Seaborg predicted that the longest-lived isotope of element 104, for example, will have a half-life of only a few minutes or less. With element 106, this will be reduced to but a few seconds or less, and no isotope of element 108 is likely to have a half-life of more than a tenth of a second.

Dr. Seaborg also described the current research efforts of Dr. Albert Ghiorso and his co-workers to discover element 103 in the heavy ion linear accelerator at the Lawrence Radiation Laboratory.

• Science News Letter, 78:421 December 24, 1960



PURE CALIFORNIUM

15
1960

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

Early Monster

A SCIENCE SERVICE PUBLICATION

11 Delegates to U.N. From African Nations Tour U.C.



AMBASSADOR JOSEPH OWONO OF CAMEROON REPUBLIC
Shoots campus sights during Bay Area tour

Eleven United Nations delegates from African countries got a taste of American higher education yesterday with a tour of the University of California.

At a later press conference in San Francisco, Ambassador Frederic Guirma of Upper Volta, said he hoped U.S. President-elect John F. Kennedy would give details of his peace corps campaign proposal that would send young Americans into emerging nations.

The U.C. tour and news session were part of a weekend Bay Area junket by the legates under State Department auspices. They visit Treasure Island today and leave Monday for Dallas, Texas.

The African statesmen lunched on the Berkeley campus, with U.C. President Clark Kerr as host. An evening reception at the San Francisco World Trade Center also was on their agenda.

In his press conference statement, Guirma said, "Now that Senator Kennedy is elected, I hope he will clarify his thoughts on the (peace corps) subject because we are so interested in the plan.

"I would like him to tell us now how he plans to implement the proposal. Later on, our governments can reply to his proposal and make suggestions." Guirma's nation has a population of some 4 million.

The Kennedy proposal stipulated a peace corps he made up of qualified, talented young men, versed in the language, skills and customs of the countries to which they'd be assigned. The President-elect stressed the need for sending these Americans to the new nations of Africa.

He made this proposal in a San Francisco address in the waning days of the hard-fought campaign.



CAMPUS TOUR—U.C. Chancellor Glenn T. Seaborg hosted 11 United Nations delegates from African nations during a tour of the Berkeley campus yesterday. Among them (from left) Gerard McKenzie of Gabon, Nomo Kaka of Niger, J. P. Toura Gaba of Chad and Michel Gallin-Douathe of the Central African Republic.

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