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Radiation Laboratory

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Summary of the Research Progress Meeting of November 16, 1950

Margaret Foss Folden

April 4, 1951

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Berkeley, California

Summary of the Research Progress Meeting

of November 16, 1950

Margaret Foss Folden

Radiation Laboratory, Department of Physics
University of California, Berkeley, California

April 4, 1951

Carbon Reactions in Nuclear Emulsions. James F. Miller.

The program for the study of nuclear emulsions, exposed to the C^{12} and C^{13} beam has continued. Ilford E-1 plates have been used and over three hundred thousand tracks have been examined. A number of elastic collisions have been observed; however, not an exceptional number of inelastic collisions are evidenced. No hammer tracks have been observed, such as might arise from Li^8 knocked out of the nucleus. No alpha emission at the end of the tracks has been found. When gold foil was placed over the plates no evidence of fission fragment was discovered. Stars of 2, 3, 4 and 5 prongs have been seen. Results are tabulated in Table I.

Table I

	C^{12}	C^{13}
2 prong inelastic	11	10
3	8	16
4	7	5
5	2	1
	28	32

A photograph of the apparatus, see Fig. 1, and several mosaics of track found in the emulsion were shown. Fig. 2 shows comparatively an alpha, a C^{13} and a C^{12} track. Fig. 3 is an example of a 5 prong star.

The 28 stars found from the C^{12} beam were obtained from scanning 43,000

tracks. The 32 stars found from the C^{13} beam were obtained from scanning 150,000 tracks. The m.f.p. for star production is λ = 25.8 cm or 101 grams/cm^2. λ = 42.5 cm or 166.5 grams/cm^2 if all two pronged stars are omitted. In previous work by L. Germain, with 95 Mev protons, λ = 6.9 grams/cm^2 and with 285 Mev protons λ = 345 grams/cm^2. The cross section for star production equals 0.49 barn. It is apparent that the energy balance in the stars is not good, so it is thought that quite a number of neutrons must be given off. Further work will be done on this problem.

Progress Report on the Lipoprotein Research. Hardin Jones.

Lipoproteins are macro-molecules of a repetitious structure of several types. They contain all the lipids present in the circulating blood, including the fats and fatty substances. The lipoproteins are divided into two classes: the alpha and the beta lipoproteins. Most studies at this laboratory have been on the β structures, for this type seems the most closely related to the problem of arterial sclerosis. So far eight classes have been identified within the β' group. Most persons have only the first class in dominant number. Separation of these classes is accomplished with the use of the ultracentrifuge. One class has a molecular weight of about 1,000 with 3 to 6 Svedberg units; another 6 to 8, another 13, etc. Molecules of Svedberg 20 have increased to a molecular weight of about 6 x 10^6. The main group has a molecular weight of about 1 x 10^6. The extreme groups go as high as a molecular weight of 30 x 10^6. By labeling the molecules with various radioactive atoms such as P^{32} and H^3, it has been found that the turn-over rate is 16 to 20 minutes. In arterial sclerosis the molecules of atomic weight of two to four million seem to be the most significant. It is still thought that these molecules may found the arterial lesions which bring about the disease. So far, however, this theory has not been traced.

In cases of animals with thyroid disturbances, the principal form of the

lipoprotein is in the molecules of the type associated with arterial sclerosis. In hypo-thyroidism these molecules reach a great height. In xanthoid metabolic disturbances, lipoid fractions are deposited in the skin like the arterial lesions. Treatments are now being carried out with thyroid extract and these show a variation in the pattern and a reduction in the number of the lipoprotein molecules. Various lipotropic agents to aid fat metabolism, like methionine and choline, are being tested. To date the effectiveness is questioned and diet is still apparently the most effective agent is reducing the number of lipoprotein molecules. It is possible that the reduction of these molecules by diet may relieve only one of several symptoms of arterial sclerosis rather than all of them. Endocrine studies are also being made. ACTH, it appears, will lower the lipoproteins as a general group. Another hormone, heparin, decreases the blood clotting time. It will decrease the level of protein but seems to do so especially on atypical ones. This will be investigated further. Irradiated rabbits have also been studied. These rabbits developed bleeding tendencies. Their atypical large molecules disappear, probably producing heparin. It has been found that the opalescence discovered by Rosenthal in the blood or serum of irradiated rabbits is due to the large molecules of around 90 Svedberg units and six million molecular weight. These are the animals which usually die. Studies are continuing on the various factors affecting the development of arterial sclerosis.

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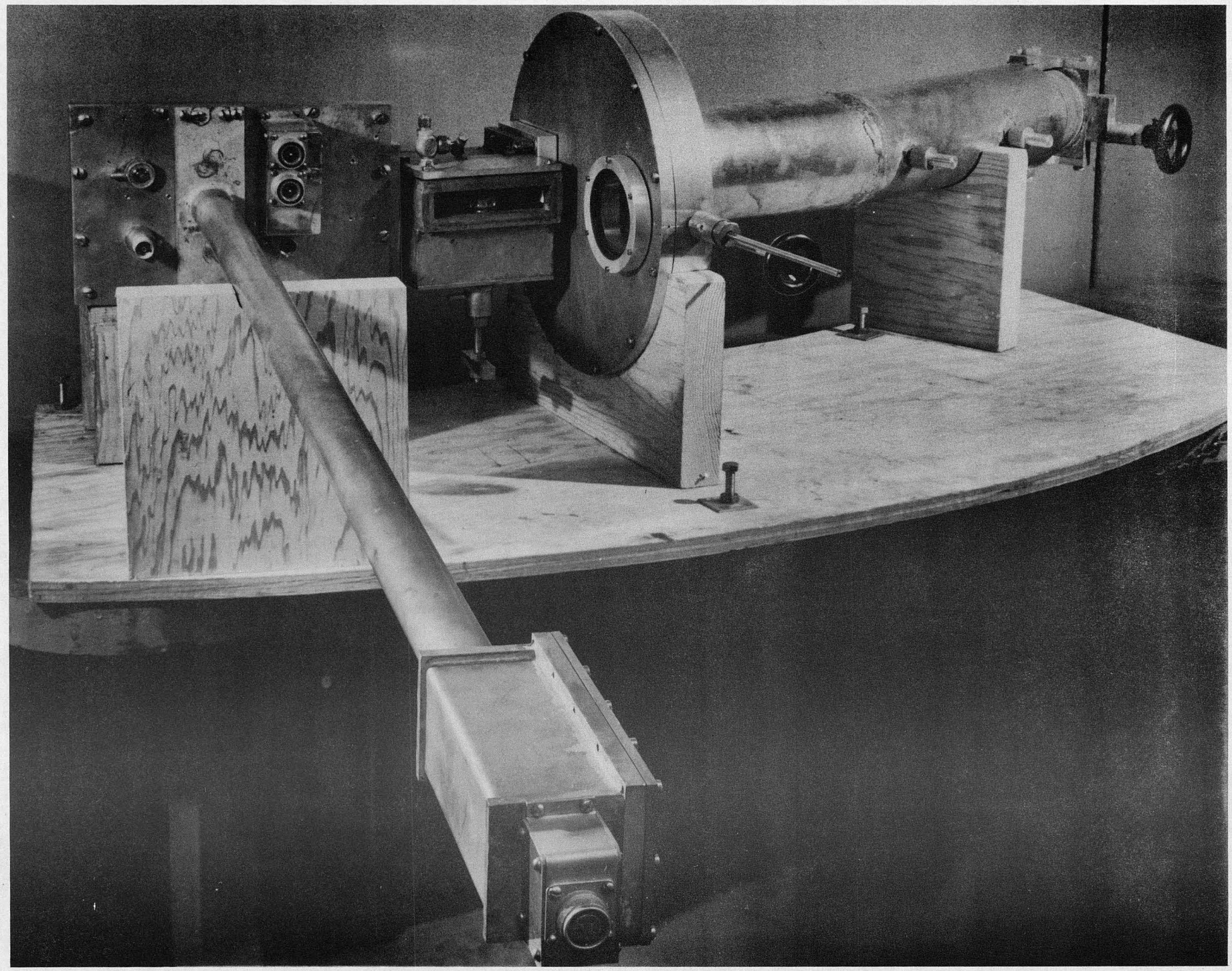

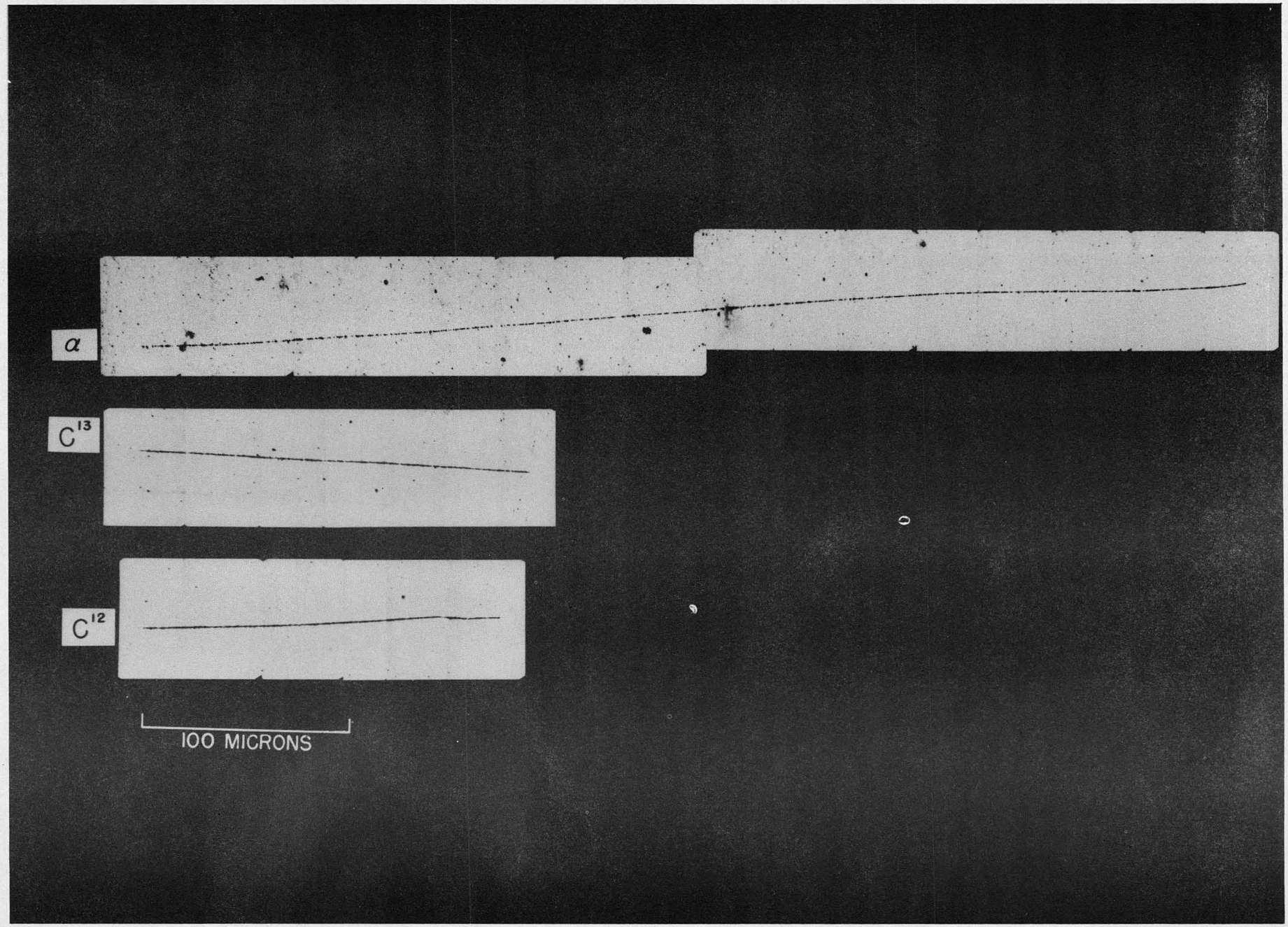
α
C^{13}
C^{12}
100 MICRONS