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Seismic Summer: The story of eleven men and one woman sailing across the South Pacific to study the quivering sea floor

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# **SEISMIC SUMMER**

The story of eleven men and one woman sailing across  
the South Pacific  
to study the quivering sea floor.

By

**MARGE BRADNER**

The great sea  
Moves me!  
The great sea  
Sets me adrift!  
It moves me  
Like algae on stones  
In running brook water.  
The vault of heaven  
Moves me!  
The mighty weather  
Storms through my soul.  
It tears me with it,  
And I tremble with joy.\*

\* Peter Freuchen's Book of the Eskimos.



**Marge Bradner at the helm of the Schooner DWYN WEN**

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## INTRODUCTION

The South Pacific has been well traveled and studied and photographed. Reports and tales have been written by such well-known scientists and writers as Mead, Melville, Michener, and Maugham. Their writings give well rounded, interesting, fictional, or factual accounts of their particular interests in this fascinating region. My story is different.... one woman and eleven men sailing the South Pacific on a scientific expedition. Our task was to study the microseisms on the ocean floor several miles below us. What are the movements? What causes them?

For more than thirty years competent scientists have debated the origin of land microseism, the continual tiny quivering of the earth. During microseismic storms, the amplitude of the quiver increases as the ground waves travel across whole continents. The energy seems to come from the sea. Some observers claim that large waves shake the shoreline; though the frequency is wrong. Other observers believe the origin is in a zone about two hundred miles wide near shore; or in the winter storms in the Arctic Ocean and the Ross Sea off New Zealand. One famous geophysicist claims that microseisms are merely the rheumatic creaking of the earth's crust as it contracts. Some theories predict that the ocean-bottom will be quieter than land; others predict that it will be more agitated.

In 1963, the University of California made the first set of seismic background measurements in the deep waters across the Pacific Ocean to settle some of the controversy.

My story concerns the collection of the data, the men and woman who took part, the islands visited, and the people who made the seismic summer a truly exciting adventure.



**The DWYN WEN under sail**

## CHAPTER I “YOU’D BETTER BRING EAR PLUGS!”

The house was in a shambles. Rough ship-board clothes were in one pile, suits, stockings and ski clothes for a New Zealand winter in another, summer cottons for Hawaii on top of my desk, my typewriter and books by the door to hand carry, Bari’s trunk for college rapidly being filled with blankets, a lamp, desk set, reference books, all those things that could be shipped a couple of months early. And, the telephone had been ringing constantly!

My “hello” was a bit abrupt and unenthusiastic.

“Will you accept charges on a ship to shore phone call from the Schooner DWYN WEN?”

My response was affirmative but all sorts of questions and doubts and fears ran through my mind. Was it Brad? Why was he calling? Is everything all right? In our family long distance phone calls, particularly overseas ones, are reserved for emergencies and birthdays. Perhaps Brad had decided that a South Seas Schooner was not the place for his wife. I was almost packed. Was he going to tell me not to come? What about the technical equipment? If the instruments were lost or failed to produce a record, the Expedition would be cancelled.

These thoughts kept repeating themselves as the overseas operator explained the procedures of an overseas ship to shore radio phone call. I unconsciously absorbed the essentials: only one voice could be transmitted at a time; after OVER, it was my turn; I was to sign off each message with OVER. This would continue until the final OVER AND OUT at the conclusion of the conversation.

“Hi, Marge, it’s a beautiful ship and a wonderful crew. We’re looking forward to seeing you next week. I have some requests. Do you read me? OVER”

“Darling, it’s good to hear your voice. Is everything all right? You’re coming in fine. Can you hear me? .....excuse me, OVER”

“I read you loud and clear. Everything proceeding on schedule and going well. We badly need some apparatus from the lab. on campus.”

There followed a description of crystals ( $\frac{1}{2}$  cm by 1 cm sq. with a pair of pin contacts, one labeled 15T the other 15R), Citizens band channel 15 mini-phones, Viking messenger transmitter, strobe flash, etc. Some things were on the shelf over the work bench about 3/4 of the way back from, the door on the east wall; others in the cabinet under the sink on the left hand side; still others in the storage bin to the right of the sphere cases. He asked me to read back the list of apparatus to be sure that I had it all down correctly. I did, from my copious notes.

“Roger. OVER AND OUT.”



Of all the impersonal telephone conversations, this took the prize! Brad is really a very warm and loving guy. It wasn't until later that I learned that there were half a dozen crew members sitting around listening to the conversation. But, my immediate pique was tempered by the thoughts, "Yippee!" I am going! It's real! I had to go. Nothing could stop me now.

This call meant one more urgent chore, priority A, to fit in to my busy schedule. I immediately went over to the lab. and fortunately found a geophysicist on hand to help me locate the various items (I really didn't know the difference between a crystal and a transistor) and pack them. Each grey metal case was marked FRAGILE, HANDLE WITH CARE, and THIS SIDE UP. With this carefully packed technical equipment, my accompanying baggage became tremendously over weight.....twenty-nine pounds to be exact.

I had been hoping to participate in the Deep Ocean Seismic Expedition for months; I had been planning on it for weeks; now with twenty-nine pounds of technical excess baggage, I was a part of the Expedition.

My husband, Hugh Bradner "Brad", was the Chief Scientist of the Expedition. He is a research physicist at the Institute of Geophysics and Planetary Physics and Professor of Aerospace Science at the University of California San Diego in La Jolla. Brad received his doctors degree in physics from the California Institute of Technology in 1941. For many years he was involved in nuclear physics. He was one of the first three scientists to arrive at Los Alamos in 1943. It was at Los Alamos that we met and were married and our daughter, Bari, was born. As a research scientist at the Lawrence Radiation Laboratory at the University of California in Berkeley, he was concerned first with the Linear Accelerator and later with the Hydrogen Bubble Chamber. Since 1961 he has been with the University in La Jolla under whose auspices the summer seismic study was done. He has loved water and the sea from a very early age. At the age of three his father tossed him off the side of a pier into the Atlantic. From that time on, he has never stopped swimming.....coach of the Cal. Tech. swimming and water polo teams; one of the early men to make an officially recorded deep SCUBA dive in the United States; inventor of the wet suit for divers; co-inventor of the parascleral contact lens for use by divers; member of government committees on the use of man underwater; the Mine Advisory Committee.

The beginning of the Deep Ocean Seismic Expedition was long before the sailing of the DWYN WEN from San Diego. For almost two years Brad had been developing equipment necessary for making deep ocean microseismic measurements and studying published works on seismology.

A new technique of making measurements at sea had to be developed. He had to prove out a method of dropping equipment to the bottom of the ocean without lines attached to the surface; a means of permitting a data filled instrument to return to the surface; and a mechanism for picking up this package onto the deck of a rolling ship in a choppy sea.

The detailed seismic equipment was built for the task. Ordinary seismometers which needed to be leveled carefully after placing on a pedestal could not be used. Limited space, limited power and limited weight necessitated small accurate tape recorders, amplifiers and batteries.

A package for carrying these instruments to the bottom had to be developed. A package that would be buoyant and watertight and able to withstand the enormous pressures exerted miles below the surface of the sea. Alcoa fabricated several pairs of high-strength aluminum hemispheres two feet in diameter to house the equipment. The "O" ring seal between two hemispheres had to be faultless, and the metal had to be polished with the finest carborundum paper before each assembly. The spheres underwent thorough tests in the Naval Research Laboratory pressure tank before the early tests were made at sea. All went well.

Amplifiers were furnished by United Electro Dynamics who also put together the components of the package. Precision Instrument Company furnished a small high-quality magnetic tape deck to record the microseismic data.

The seismometers finally chosen had been designed at the California Institute of Technology to be launched into space and landed on the moon, and they were ideally suited for the equally remote region of the ocean bottom. Their sensitivity and weight and natural period were all just about right. They contained a small motor to automatically put them into operating position at almost any planting angle.

The only missing item was a compass-and-tiltmeter to indicate the exact orientation of the seismometer package on the ocean bottom. United Electro Dynamics devised one, using sensitive photo-emulsion in a fist-sized dome.

An anchor with a lead spike to penetrate the sea floor was attached to the sphere. It was fastened by a Van Dorn release, a magnesium rod which was calculated to dissolve after a given period of time thus dropping the anchor and allowing the sphere to float freely to the surface. The package was now ready to be dropped to the bottom of, the sea, where it would make a recording, and then return to the surface if all went well.

Locating a two-foot diameter object floating freely on the ocean also presented problems. All of the work of the expedition would be for nought if the tapes of data were not located and carefully packed and shipped back to the laboratory in La Jolla for analysis. Sextant readings could keep the ship within a few miles of the drop

spot. But in a rolling sea, more was needed. The sphere was equipped with a radio transmitter which sent a beeping tone ten miles. The ship could tell the direction of the sphere by attaching a radio receiver to a directional Yagi antenna mounted on top of a mast.

Preliminary experiments had been carried out first in the deep trough off the coast of Southern California; further tests off the island of Oahu in the Hawaiian chain. A few drops had been made in deep open ocean. Measurements to depths exceeding 15000 ft. were to be conducted on the San Diego-Kailua, Hawaii, leg of the expedition.

Jim Dodds, blond, intense, competent, a young man of medium height and slight build, a physicist by training, had been working with Brad on deep ocean microseisms for the previous two years in La Jolla and Hawaii. Jim doesn't like the sea. He barely tolerates it, in fact. He is much more interested in advanced mathematics and digital computers. However, he was going along on the first leg of the trip. It was Jim who gave a title to the technical notebooks....Glub I, Glub II and Glub III.....to perpetuate the glub glubbing sound as the sphere sank below the surface.

Brad and Jim had haunted scientists, literature and records to determine all that was previously known about sea floor microseisms. Their search was almost fruitless. A few laboratories in this country and one abroad had made a combined total of less than a half-dozen measurements. Results were inconclusive. Data from one laboratory contradicted that from another. Not a sufficient number of successful measurements had been made to give a realistic report of the movements on the ocean floor.

A ship was needed for the Deep Ocean Seismic Expedition. It had to be large enough to accommodate four scientists and the necessary crew and equipment. It had to be small enough and low enough to the water to launch and recover the seismic spheres. It had to be sufficiently maneuverable to home in on a small object in the sea and to negotiate uncertain, poorly marked coral channels. A few months before the expedition date a ship was recommended, the schooner DWYN WEN. This ship was immediately investigated by the Chief Scientist and others. It seemed to be ideal. Dwyn Wen is Welsh for Pleasant Expectations.

In early June she sailed into the National Steel Shipyard in San Diego to be outfitted for the expedition and to be used for pre-expedition experiments in the San Diego trough. This ship, her skipper and crew fulfilled all expectations.

The next two weeks were hectic ones. Between one day sea trips, the Yagi antenna had to be attached to the foremast, the marine radio transmitter and receiver installed and checked, the ship had to be put on the ways for the marine insurance

inspector's survey. Administrative paper work and red tape consumed much time: personnel records, official documents, landing permissions, passports and visas, provisions were ordered and layed in for a three month sea voyage, the freezer was filled with meats and ice cream and frozen milk. Dozens of loaves of bread, hundreds of eggs and thousands of cans of food were stowed in every available corner. The technical equipment came on last. The spheres were securely lashed on deck, storage chests were lashed below, electronic gear rapidly filled a starboard stateroom which became known as the 'electronics cabin.' Other chests in the deck cargo contained SCUBA tanks, regulators and wet suits. Medical supplies were stowed away in the chart house; technical notebooks, reference books and source material in the electronics cabin. In the map drawer in the chart house were contour charts of the ocean floor with geologic notations which had been collected and studied, because it was essential to make use of every known fact about depth and bottom conditions, deep ocean currents, surface currents, characteristics of wind and waves and weather, locations of hidden reefs and shoaling waters. My carefully chosen library on the art, history, geography, anthropology, flora and fauna and fiction was placed in the salon where it would be available to all. Finally my personal gear went aboard. Optimistically I shipped a duffel bag of warm clothes and my skis, hoping for a week of skiing in New Zealand at the conclusion of the expedition.

Everything was ready. The crew returned from a final fresh water shower. The aroma of baked ham with pineapple and cloves wafted from the galley. The skipper, at the helm, called out orders. Each seaman stood by his duty station working feverishly to cast off and get started on a South Sea adventure cruise.

In addition to Brad and Jim, the scientific team included Forrest Whitcomb and Bob Foulks. Forrest, a tall, silent and competent engineer, had been with the seismic group since its inception. Never a lover of the sea, he did not become one during the expedition and would prefer never to go to sea again. But when the time for departure came, Forrest was on deck with a resigned look on his face, ready to do anything that would benefit the research, even if it meant existing on a sailboat for nearly three months.

The last member of the scientific party was Bob Foulks. He perched high in the rigging where he would have the longest possible sight of his beautiful foreign wife and three young children. Bob had just received his master's degree in physics from the University of California in Berkley and joined the seismic group in La Jolla. Parting from his family was obviously difficult, but Bob loves the sea. He was raised around boats, but he found that acquiring an education and getting a family underway at the same time made a boat of his own out of the question. The remedies

for this condition? Bob says “One is hard work and frugality - he Puritan Ethic. Another is to join the Navy, but this is risky. The would-be sailor just might end up at an Ordnance Depot in Indiana or on the Desert Ship at White Sands Missile Range. My own remedy was very simple - I just got plain dumb lucky.”

Bari and I watched as the DWYN WEN proceeded through the channel into the waters of San Diego Bay. Bari was memorizing every detail of the ship which would be her parents' home for the summer. When she enrolled as a freshman at the university in the fall, they would be somewhere on the open sea south of the equator.

I watched the sailing of the DWYN WEN with mixed emotions. It was difficult to realize that in four weeks I would be joining the ship to follow the Great Circle Route across the South Pacific. The first leg of the trip was for the purpose of checking out experimental operations. After a brief stop at Kailua, Hawaii, the program called for a week of experiments off the Kona Coast. The plan was to have me join the ship when she returned to Kailua after these tests. The whole projected expedition and my participation in it seemed like a dream. Could it be possible that a grey haired, middle aged, conventional housewife would be sailing across the ocean as a part of a scientific team and a sailing crew? My scientific experience was limited to executive secretarial work in chemistry and nuclear physics. This expedition was geophysics and oceanography. My sailing experience was limited to two short trips, one in San Francisco Bay and the other in the near ocean out from Mission Bay. This trip would be two months on the high seas. My office supplies were on board. It seemed real, yet I almost expected to wake up at any moment. I wouldn't be joining the ship for a month. Many things could happen in that length of time.

In our family we rub elbows with the unexpected. Our predetermined schedules bear little resemblance to actual activities. Would my anticipated sharing of the summer trip be one of those altered schedules? I remember the time I was furiously studying Spanish in preparation for a trip to Mexico when Brad called from the lab. “How'd you like to go, to Geneva?” I dropped Spanish and took up French. Even then, it wasn't until we were high in the clouds over the Atlantic beyond the point of no return, that I felt I was really on the way. I couldn't help thinking that there might be the unexpected, almost half expected, cancellation of my participation in the expedition.

It would be three weeks before the ship arrived at Kailua, three weeks before I would hear any news, three hectic weeks for me. Three and a half weeks passed and still no word....I was becoming anxious. Then I received Brad's ship to shore SOS call for more lab equipment.

The following day a card from Brad arrived. The schedule was indefinite and if the ship was not in Kailua when I got there, I was to contact the Arthur Draeger family who had adopted and given the scientists and crew of the DWYN WEN the warmest welcome. Their home and shower had been shared hospitably with the ship family. The Draegers would be able to answer questions, solve problems and give advice.

Another card in the same mail:

“Dear Marge,

It’s a great ship. You’ll, have a great time.

Jim

P.S. You’d better bring ear plugs!”

So, on July 23, I said goodbye to Bari and left her in charge of the house, garden, cat, cars and assorted groups of house guests. I was off on the first leg of my Deep Ocean Seismic Summer.

Honolulu had grown tremendously since my last visit three years earlier. Friends met me and drove me around Diamond Head, past Koko Crater, Waimanalo, Makapuu Point and over the old Pali road which was my only first-hand knowledge of a tropical paradise.

A small plane of the Aloha Airlines took off from Honolulu late that afternoon. I asked the hostess about Kailua-Kona, the town and the people. She did not know this area well as her home was on the opposite side of the Big Island. A few moments later she came to tell me that a gentleman on board lived in Kailua and would like to talk with me.

He was the editor, publisher, type setter and photographer of the KONA Torch. I learned that the cattle ranches were as large as many in Texas and that the wharf in the harbor was built with cattle stockades so that cattle could be loaded directly onto inter-island ships. Kona coffee is a large industry and the schools are closed during the coffee picking season to enable the youngsters to add their help in harvesting the crop. He started telling me some stories of the menhunes but skillfully wove his comments into a press interview of a tourist arriving on the Kona Coast for the first time. It didn’t take long for him to learn that I was on my way to join the DWYN WEN.

“The DWYN WEN!” I was no longer talking with a reporter but with a lover of the ships that sail the seas. Few of these magnificent old schooners are still being used.....”entering her paneled salon was just like entering into another world.” He had been on board and had met her, skipper and crew and scientists. His one criticism was that the skipper and crew had an almost impossible task in trying to keep things ship-shape as the scientists had strewn gear, instruments and equipment

all over the place. To him it was a beautiful sailing ship being debased in the name of science. My joining the ship he greeted first with surprise, then wonder and finally admiration. He implied that it would be good for the ship and for the work, but he wasn't sure how I would like it.

As we taxied down the runway after landing the sun was just disappearing behind the distant horizon and the sky was a blaze in crimson, gold and muted purple. The airstrip is carved from a lava flow at the edge of the sea. The scrub growth is trying desperately to gain a foothold and find a little soil in which to thrive. The terminal, open on all sides, was filled with colorful muu muu and aloha shirted friends of the disembarking passengers. I was scanning the area for a taxi when a slender sparkling blond woman placed a plumeria lei around my neck say, "Welcome to Kailua, Marge." I was easy to recognize as I was the only non-Polynesian on board.

The ship had prepared a warm absentee welcome for me. Dot Draeger and her family adopted me immediately as a part of the DWYN WEN family. The DWYN WEN itself was about thirty miles off shore still making tests but should return soon.

We deposited my FRAGILE luggage at the Inn on our way to their home for dinner. The Draegers had left the mainland to escape the hectic pace of modern living and now owned a small curio shop on the sleepy waterfront main street overlooking the harbor and the sea. My first information and impressions of the DWYN WEN crew unfolded. They were all raising beards with the exception of Brad and the Skipper. They are mostly young fellows. Next to girls, they had two main interests in Kailua.....mail and fresh water showers.

I said goodnight to these new friends and returned to the Inn. It had been a long day. Just before dropping off into an exhausted sleep, I saw the full tropic moon reflected in the smooth Kailua harbor.

I awoke to the sounds of myna birds in the garden and the gentle slap slap of the surf just outside my window. The full harbor was visible but no two masted schooner had quietly entered and anchored in the harbor during the night.

The harbor was beautiful and active, crowded with fishing boats of all sizes in this busy marlin season. A few sailing ships set me dreaming of the one I would board soon. Did I have one, two or three days to occupy myself before the ship arrived? It might arrive momentarily. My final shopping was accomplished in the morning.....insect repellent, extra bathing suits, a couple of muu muus for shore visits. I found an interesting A-frame muu muu. Modern stypes have even invaded the missionary Mother Hubbard. Luncheon at a home high in the mountains overlooking the harbor where the gentle trades air conditioned the sweeping lanai and gardens.

Late afternoon.....still no schooner. I found my way to the swimming pool. It is built out over a coral reef and filled with sea water. The waves broke over the barrier into the deep end of the pool. There were interesting and typical groups around: the obnoxious tourist not interested in the pool or the scenery but keeping his ear glued to the transistor radio and the Sonny Liston fight and during the commercials discussing his evening bridge game; the young secretary who had been saving up for years and had finally been able to spend her two week vacation traveling breathlessly around the enchanted isles; the vacationing families playing and splashing in the pool with their children; the bus tours coming in from Hilo, each member of the party with identical air line bag, travel folders and orchid.

I was paged. Maybe this was news. It must be Brad on the ship to shore radio. "Hello."

"Honolulu, I'm ready on your call to Kailua." It couldn't be Brad unless the ship had been blown way off its course.

"Marge, when's the ship due to arrive and how long will it be in Kailua?"

It was a scientist in Honolulu. I told him that I wished I knew the answers to his questions but was just as much in the dark as he was. He was sending some materials for the men on Palmyra on the afternoon plane. I hurriedly made notes of this conversation and added them to the increasing pile of correspondence for Brad, encouraged to know that I was not alone watching and waiting for the DWYN WEN. Why didn't we hear?

The Wharf hummed with activity. Marlin fishermen had come from all over the world to try their luck in the waters off the Kona coast. A boat docked with a huge marlin on the deck and a happy sportsman at the bow accepting congratulations and directing the unloading and weighing, and posing for pictures. The weight was duly recorded and compared with the record catch of the season.

Evening found me again at the wharf scanning the harbor entrance for a large schooner. No schooner but a new and different boat pulled alongside, the IMUA. This boat was equipped with a canvas hammock slung between the masts and on the hammock was cradled a frightened Pilot Whale, feebly blowing spray and fluttering his tail. He was gently packed in sponge rubber and covered with a blanket on which a continual spray of sea water played. The whale had first been sighted by a pilot of the Hawaiian Wings Corp who, after radioing the IMUA, circled over the whale until the ship appeared. The crew carefully brought the whale on board and headed for the harbor. Shortly afterward another plane rushed this delicate cargo to Honolulu where it was transferred to a truck and delivered to SEA LIFE PARK at Makapuu Point on the Island of Oahu.



I returned to the hotel to continue reading Douglas L. Oliver's magnificent book on "The Pacific Islands," already beginning to feel a part of the Pacific and Polynesia. I drowsed, rolled over, turned off the lights and opened the drapes. The harbor at night was beautiful. The ships and the lights were right outside my window. But one stood out! A large two masted vessel, showing her overhead lights, was anchoring about two hundred feet off shore! I threw on a muu muu, slipped into my beach walks and went running outside. No way to call them (the surf always seems to be thundering louder than ever in the middle of the night). The Inn manager was no help in trying to find out the name of the ship. Should I go down to the dock and wait until Brad came to shore, or would the shore boat come toward the Inn or some other landing? Nothing to do but return to my room and wait, but not for long. The manager called.

"Mrs. Bradner, your husband is in the lobby."

I rushed from my room down the open verandah, past the tropical garden and into the lobby. There Brad was standing beside the over-sized split leaf philodendron looking as handsome as ever, tall, tanned, tired and tattered but happy and glad to see me. His smile and greeting told me that all was going well and I was still to join the expedition. I gave him the correspondence, detailed the messages and pointed out the FRAGILE equipment that I had hand carried from the mainland.

He wanted me to meet the crew so we walked arm in arm down the main street passed the banyan trees, the Black Coral shop, and the fragrant ginger gardens to an outdoor restaurant where a ragged looking group of sea faring men clustered around a corner table enjoying shore leave.

This was an interesting meeting. Would they accept me as a member of the team or would they resent having a woman join this all male ship? How should I react, should I stay aloof from them or should I try to become "one of the boys?" Was I going to be a good sailor or a sea-sick one? As I walked up to the table, I tried to read their faces. Royd's heavy black beard and dark rimmed glasses camouflaged any expression. Stan's polite cordiality told me nothing. Jerry formally acknowledged the introduction. The three stooges (so much alike I couldn't distinguish one from the other at first glance) just stared. But I did get a warm welcome from the scientists, Bob, Jim and Forrest. They greeted me as a long lost friend and barraged me with questions. I produced letters, notes and pictures from home.

As they buried their noses in their mail, I turned my attention to the crew. They were young fellows not much older than our daughter Bari....but they were a different lot than the boys Bari brought around home. There was not a smooth shaven face in the group nor had any of them seen a barber for some time. Their

tanned skins, sun bleached hair, calloused hands and bulging muscles gave evidence of heavy work and exposure to the weather. My limited sailing experience and only academic knowledge of the South Pacific prevented much conversational communication. My questions, and I'm afraid they were naive ones, drew innocuous answers. If I singled out one crew member to talk with, a couple of others moved in. If I chatted with the scientists, the crew drew apart. The sparring went on. A few beers later, I mentioned that the manager of the Inn had left a stack of fresh towels in my room and that the hot water supply was unlimited. Showers! A spark appeared in some eyes as if to say "Things could be worse."

Next morning saw the beginning of thirty-six hours of constant activity. First order of business was establishing the two way radio contact between the Inn and the ship. I was to man the Inn station. "One, two, three testing. OVER" All worked well. Each man had his responsibilities: the laundry had to be brought ashore and delivered; perishable produce ordered for the last possible moment; expended stores required replacement; official documents for harbor entrance and departure were negotiated; gifts for Polynesian chiefs were purchased; correspondence, official and unofficial, had to be written and mailed; a dentist in Kealakekua made time to repair a seaman's cracked tooth.

The scientists were busy in another direction. Long distance telephone calls to learn how the other scientific experiments were progressing and to report on the present status of the Deep Ocean Seismic work; modifications of equipment had to be made while the DWYN WEN was anchored in a calm harbor; every piece of equipment, materials, replacements, supplies that might possibly be needed had to be determined, located and purchased. This was the last port of sufficient size for locating replacements until after the conclusion of the expedition. The airport and shipping busses were checked hourly for the equipment coming in from many different directions. Delicate equipment had to be carefully packed and loaded on board the ship.

Each scientist and each crew member had his assigned duties during this period. I kept out of everyone's way and tried to make myself inconspicuous. I wanted to be helpful, but other than taking a bit of dictation and typing a few letters, there was not much else I could do. The afternoon found me at the pool having a final swim and sun bath on land. We would be moving on board in a few hours. Once again I was paged for the phone. I took notes and then activated the two-way radio.

"Station 1 calling the DWYN WEN. Come in please. OVER"

No answer.

“Station 1 calling the DWYN WEN. DWYN WEN this is station 1. Do you hear me? Please come in. OVER”

Still there was no answer.....a long wait. I was beginning to think about sending up smoke signals or to swim out to the ship.

“Marge, this is Brad. Do you have a message? OVER”

“Yes. I’ve been trying to reach you. Klaus just phoned from Honolulu. There are some essential radio repair parts needed by the men on Palmyra. HOLD SHIP DEPARTURE UNTIL THEY ARRIVE ON THE AFTERNOON PLANE FROM HONOLULU. OVER and OUT”

The afternoon plane did not bring the equipment for Palmyra. It should arrive on the morning plane. A reprieve for weary men. They found their way to the “Green Bar,” the DWYN WEN’s on-shore office. I moved to the ship and turned the hotel room over to those of the crew who desired a night’s sleep on a stable platform, reserving the right to return the next morning for a final hot shower before leaving land. Before dinner we saw Jim off at the airport. He was returning to La Jolla laden down with many rolls of magnetic tape for the laboratory to begin the long and laborious task of translating these records into comprehensible reports of the microseismic motions at the bottom of the sea. He also carried letters, notes, pictures and greetings to our landlocked family and friends. We said good-bye and wished him well with his graduate studies at Stanford.

The buoy lines, some twelve rolls of braided nylon fishline had not arrived. The manifest was at the airport saying they had arrived on the last plane from Hilo, but they couldn’t be found. Brad and I ended up going over everything in the Kailua airport warehouse and finally under a bale of lauhala mats we found the characteristically shaped spools of nylon line. While we were loading these spools on the jeep, the Honolulu plane arrived with the equipment for Palmyra.

The ship was at the dock when we returned to town. The finished laundry was going on board. The barrels and tanks were being filled. We lashed down the spools and secured the equipment for Palmyra. Our Hawaiian friends came with gifts of avocados the size of small watermelons and papayas the size of summer squash and a stalk of bananas which the Skipper tied to the main mast. On the dock were people that we had not known until a few days ago but were now our friends of the Pacific; the wrinkled old Hawaiian who had been so helpful; the dock hands who had been supplying and loading the ship; sport fishermen and fishing fleet captains; the scientists who had been scouring the Pacific for young whales for SEA LIFE PARK; the tourists who found the sailing of the DWYN WEN a major attraction during their few hour tour stop in Kailua; the townspeople and yacht lovers who realized

that this ship was one of the very few large old schooners they would ever see in the harbor; and the girls the crew were leaving behind.

The barometer was checked, the lines were loosened, the motor was started, we pushed away from the dock. Two long blasts of the ship's horn and we had started on the summer's Deep Ocean Seismic Expedition.

## CHAPTER II

### SAILING FOR SCIENCE

We powered out of the harbor as the lingering afternoon shadows fell over Kailua. The next land-fall would be days in the future. Kailua was most magnificent from the deck of the sailing ship; the dock to starboard, the Inn to port, the Hawaiian Royal Palace directly astern. We could identify the Green Bar, the Draegers' curio shop, the arcade where we had sung Hawaiian songs and danced the hula until almost dawn the night before. We passed the anchored yachts, the late fishing boats returning with their marlin flags flying, the dug-out canoe team holding evening practice. The sun was setting as we took our last look toward land. The steeple of the old church caught the last rays as if to say "Good luck, and God be with you."

I was sitting with the helmsman looking back toward shore when dinner was announced. A fringe of lights along the shoreline, a few isolated lights on the hill above town, and the dim outline of Mauna Kea silhouetted against the ever brightening stars in the sky. I said an emotional goodbye to land and headed below to eat my first of many meals on a gimbaled table.

The seas were gentle. We were in the lee of the island, but the table was tipping from one side to the other, compensating for the gentle roll of the sea. The table was heavily weighted below the center and pivoted so that it would remain level regardless of the roll of the ship. A glass of milk in the heaviest seas did not spill. One warning: **DO NOT UNDER ANY CIRCUMSTANCES LEAN OR PUT ANY WEIGHT ON THE EDGES OF THE TABLE.** As a neophyte on board, I was placed at the center, the pivotal spot, where behavior at the table was not too critical. The crew did not trust me where their dinner was concerned. Later in the trip they accepted me as one of the most reliable members on board. But this first night....no! Conversation was stilted, manners were watched, language was almost puritanical. I learned later that the captain had urged the crew to clean up their language and forecastle art gallery before the wife of the Chief Scientist came aboard. A wildly striped beach towel appeared as a curtain between the forecastle and the galley. In the rush of the cleanup, they had overlooked the reading material in the head, but the girlie magazines, while not familiar to a conventional suburban housewife, were not bad. Later I realized the crew's complete frustration at having a novice woman on board. I referred to upstairs and downstairs, the front and back of the ship, the bathroom, the stairs, the kitchen, the room, the steering wheel, the bed, etc. When I felt a little woozy after dinner and headed upstairs for a bit of fresh air, they groaned. They really didn't like women on board. They were beginning to wish they had never signed on for this expedition.

A few turns around the deck, a half hour sitting with the helmsman, the trade winds blowing in my face, a couple of seasickness pills and I felt fine and was ready to go below. The summer in the tropics is humid and hot, the air circulation below decks is non-existent, insistence on privacy is impossible. What are you going to do? Brad explained the head to me, showed me the catches on all doors and stressed the absolute necessity of securing the doors either in open or closed position at all times and anchoring or lashing everything. A spilled bottle of hand lotion would be unforgivable. On port tack brace your mattress in one direction, on starboard the other. Which was port and which was starboard? After six weeks on board I still got confused occasionally.....finally achieved a compromise... brace one foot against the bulkhead and the other against the bunk railings. A somewhat uncomfortable position but after a few nights on board it became almost automatic. I went to bed.

Sleep did not come automatically. I tried counting sheep, but they became marlin, sharks and whales swishing against the ship. A few inches of wood was all that separated me from these creatures of the deep. I tried to relax as far from the bulkhead as possible but the mattress slipped. We were under sail by this time and the sound of the ship skimming through the water was terrifying. Exhaustion, fear, tension and medication finally conquered and I drifted off after several hours of reviewing my past and present. I felt sure there would be no future.

Blessed unconsciousness lasted only momentarily. A sudden crash and a shuddering shook the whole ship. I sat up abruptly and hit my head on, the bunk above me. If I had only knocked myself out and gone to the sea unconscious. The ship was tossing and pitching, the groans and moans and creaking of the ship would make a haunted house sound like a cloistered cottage. Another terrific crash and I was sure the masts had gone. Brad was awake too. He tried to comfort me.

“You must get used to it, Marge. Everything’s OK. These are just the sounds and motions on board a sailing ship.”

I wanted to get up and awaken the captain and a few of the crew members, or send out an S.O.S. to all ships in the vicinity to come and pick us up. Brad tried to reassure me, but I still couldn’t relax. Another crash! This time I did hear someone topside doing, I hoped, something. Should I dress? If so, what? Marooned in a life boat, if we could get the life boats launched, a hundred miles from Hawaii, what would one need? My passport, traveler’s checks and camera were all that came to mind. These were my valuable possessions, but what good would they be? Reason leaves when fear takes over. I was beyond thinking and reasoning. I merely existed.....and, then it was morning.

The seas were calm. The trade winds were blowing. The smells of bacon and coffee were coming from the galley. I had survived. To see the sun again, to feel

hunger pangs, to see and feel a part of a seaworthy craft, to really see for the first time a wonderful ship and crew, gave the first spark of a deep romance with the sea, a ship and its crew.

I left my cabin that morning with a smile on my face in spite of fatigue and dark circles under my eyes. The crew looked at me with a new respect. It HAD been a rough night. Just after leaving the lee of the island we had hit a sudden violent storm. One life raft had broken loose. One of the seismic spheres had come away from its mooring and crashed against the railing of the ship. That was the most violent crash I had heard the night before. Several on the ship had been seasick. It wasn't until sometime later that I admitted that the only reason I was not seasick was that I was too damned scared!

I wore a bathing suit that morning under my A-frame muu muu. The weather was warm and beautiful. The muu muu soon came off and for the next several weeks, except when we were in port, I wore only bathing suits. I was glad that I had ransacked my daughter's closet for all her old ones, as several wore out or blew into the sea when I left them drying on the mainsail halyard.

After a hearty breakfast (I was among the minority eating that morning), I took a good look at the ship that I had committed myself to for the summer.

She is a beautiful ship, one of the few majestic old schooners still sailing the Pacific. Her mainsail and fisherman were catching the gentle breezes and moving us quietly through the long rolling swells. Land birds were still following us but as the distance from land increased, they left us. The DWYN WEN is broad of beam, twenty feet, and long, one hundred and six feet. Her teak deck is bleached almost white from repeated salt water scrubblings and tropical sun. Painted surfaces were dazzling white' and her fittings were polished to a high luster. The weather worn teak of the deck house was rubbed and varnished to a satiny finish.

From my vantage point at the helm, I could look down her full length and see the barrels of diesel oil lashed to her aft deck railings, the seismic spheres to the mid-ship railings, the extra water casks and the sphere anchor plates up forward, always leaving adequate space for the coils of ropes and winches for the operation of the vessel and the sails. The sky-lights over the salon and cabins were open to catch the breezes and make the below deck conditions cool, comfortable and pleasant. However, everyone was topside with the exception of the scientists who were busily assembling equipment.

The DWYN WEN is a type of ship that is rapidly becoming extinct. The cost of reproducing her in a modern shipyard would be prohibitive. Her hull is made of 2 to 2 1/2 inch Burma teak, reinforced by steel frames. Below water level she is of rock elm with a lead keel. Her cruising range is unlimited. She is equipped with an

auxiliary diesel motor, complete navigational equipment, ship to shore radio and air compressor. The polished binnacle enclosing the compass bears the words "Dartmouth, England 1906." Yachtsmen the world over know the DWYN WEN as one of the staunchest, ablest pleasure craft ever built.

Below decks she is equally impressive. Electric bulbs have been fitted skillfully into the old brass kerosene lamp fixtures in the teak paneled salon. Leaded glass panes enclose her book case and safe.

Her after quarters are fitted in teak and provide four double staterooms and two heads. The galley is forward near the forecabin. The staterooms for the captain and first mate are amidships. The engine is well aft.

The DWYN WEN log showed previous entries detailing voyages to the Galapagos Islands and to the Marquesas in French Polynesia, but that was all. What was her history? Where had she traveled? How was she used?

She was built for an English lord who planned to sail her around the world. She sailed from South Hampton in fair weather. Off the coast of India she was hit by terrific storms and driven far off her course. After a 17,000 mile cruise the lord placed her in drydock for repairs. He died suddenly before the ship was ready to sail again. The DWYN WEN apparently remained in Chinese waters until an American doctor, Robert H. Ellis, of Portland, Oregon, traced her down in the early twenties. He located her stripped of gear at the end of one of the slip-ways in a Hong Kong drydock. A member of Dr. Ellis' crew wrote, "A lonely, half-witted Chinaman was eating rice in the salon. A thousand choice Chinese finger marks and thumb prints decorated the white paneled woodwork of her interior. Her galley, both to eyes and nose, spoke eloquently of fourteen months of Chinese occupancy."

After fourteen months out of water in a tropical sun, her hull was still completely watertight. Nevertheless, a solid month of back breaking work was required to get the ship ready for the voyage to Portland.

The passage to Portland was a rough one. Off the coast of Japan the vessel was tossed about by the choppy sea, and it was not long before even the best of the sailors became 'internally deranged.' Seven of the fifteen chickens died during the night and were buried at sea.

After 41 days the DWYN WEN dropped anchor in Astoria harbor. For the next several years the ship got acquainted with the North Pacific and Alaskan waters.

In the mid-twenties she was purchased by Commodore Eugene Overton and was described in the newspapers of the day as one of the most famous yachts afloat. Mr. Overton and his wife sailed up and down the California coast, through the Channel Islands, and the full length of Baja California to visit their son who was



living at La Paz. They also made two extended trips into the South Pacific in 1927 and 1938.

All large sea worthy yachts were drafted into the Navy during World War II. The DWYN WEN was painted a battle ship grey inside and out. For the next few years she cruised off the coast of California on lookout patrol for enemy submarines. After the war she was honorably discharged and returned to civilian life.

At one time she got into bad company and became a revolutionary, running guns to a Central American country. Their story goes that her side had already lost when she arrived with the guns. The winning side was happy to accept the guns, and luckily happy enough about winning to turn the ship and her crew loose.

The present owner, Jim Walters, and Captain Stan Rayner have taken the DWYN WEN into French Polynesia and have sailed on pleasure cruises up and down the California and Mexican coasts. It was from the DWYN WEN's home port of Long Beach that she was chartered by the University of California for the 1963 Expedition.

My first day on the expedition was spent getting acquainted, or trying to. There was rarely anyone but the watch around. The others were either in their bunks, or sleeping under the shade of a sail on deck or dozing someplace with a book. I tried to read but found that every time I opened a book I immediately fell asleep. As a sun worshiper, I found an open spot on the deck for a sun bath. It wasn't long before I realized why the shady spots were occupied. The tropical sun is very penetrating.

I found a bit of shade cast by the mainsail back near the helm. Stan, the skipper, was at the wheel and offered me a folding deck chair. I had my first good look at the man on whom we were dependent for life and limb and a successful expedition. Bare feet, palaka shorts, heavily tanned body with a tattoo on his left arm, freckled face inset with twinkling blue eyes, and a head of sun bleached hair. He was relaxed and half-dozing, his six foot frame resting full length on the hatch, but he kept one eye on the sails and his steady right foot on the wheel to keep the sails filled by the gentle trades.

I learned that he had been raised on a farm in Alberta, Canada, and had left to join the Canadian Navy at an early age. Back in Alberta, he became a master mason. He built houses and sold them, but the sea still called. He found his way to the west coast. He signed on a sailing ship and found his way to Long Beach and the Schooner DWYN WEN.

From below decks someone yelled, "Chow."

Suddenly the ship came alive. Seamen emerged from all corners: Bob from the bow spirit where he had been calculating wind velocity; even Forrest left his bunk long enough to eat. If the morale of a ship is dependent upon its cooks, ours should

be excellent. Jack and Royd were chefs par excellence! Deviled eggs, cold cuts, potato salad, sliced tomatoes and avocado and great quantities of lemonade. It didn't matter that we shared four knives among the twelve of us. We did each have our own fork. I endeared myself to the cooks when I raved about the food and came back for seconds. They had been a little apprehensive when I came aboard because Jim, Forrest and Bob had told them of my accomplishments as a culinary expert. After looking over the galley I knew that I could swab decks, hoist sails, or do any number of the other jobs on shipboard, but I was convinced that cooking in a rolling ship's galley was beyond my capabilities.

After lunch I collapsed for an hour and fell immediately into complete dreamless slumber. When I awoke the breezes had freshened and we were well heeled over on the starboard tack and making good speed. My sea legs had arrived and I was able to make it aft to the helm without my former hand hold to hand hold.

Jerry, the first mate, was on watch. He is an immense man: tall, broad shouldered and heavy set. Except for the two cooks, Jerry was the only college graduate on the crew. He had a degree in engineering which proved a valuable background when we had problems with the motor or compressor. His formality toward the only woman on board and the scientists was natural. His father was a naval officer and he had been raised with navy protocol. He did break down and start calling me Marge after a few days, but it wasn't until after we arrived in New Zealand that he was able to call the Chief Scientist anything other than Dr. Bradner. Jerry had always had a boat. His present one was in a San Francisco yacht harbor. He was now mainly interested in open ocean sailing and particularly in getting back to Tahiti and Moorea. He had become entranced by these two islands when he had put into Papeete harbor a few years earlier on the WANDERER.

On shore he was a sports car racer. He gave me half an hour of detailed reports on cars, motors, torque suspension, raceways. I learned that the motor scooter carefully stored next to the engine below belonged to Jerry.

The trades kept us skimming gently through the water. The white billowy clouds floated through the sky giving us an occasional shady break. Off in the distance a darker cloud was approaching. We were running a collision course with a tropical squall. I looked forward to being drenched and then drying out after it passed. The sudden tropical rains in Hawaii had always found me outdoors walking on the beach. As the first drops hit the ship, the crew suddenly became alive again. Everyone came on deck dropping his towel in the chart house on the way out. Then the sudden start and realization.

“Marge, I think you'd better go below, as the fellows want to take advantage of the squall for a shower.”

I sat in the salon alone trying to read but listening to the shower baritones coming from above. How was I going to get a shower if they sent me below every time a squall came up? They came below clean and shinning. I did what I could with a cup of fresh water but it wasn't too satisfactory. Fresh water is at a premium on any sailing ship. We were informed that there was plenty for cooking, drinking and brushing teeth, but that was all. I hoped that eventually they would let me have the deck during a squall and put Brad at the helm. But not yet. This first day they were still only tolerating me.

The heavy downpour had soaked everything topside. Bob noticed a trickle of water coming from the emergency light that was kept within easy reach near the helm. A lamp attached to a life preserver is a very important safety measure at sea. Any man who slips overboard at night is sure to be lost unless a marker is thrown over immediately. The safety light on the DWYN WEN was a waterproof lamp, with external electric contacts that were shorted by salt water. Rain water should certainly not be trickling out of it. The cylinder and connecting wires were found to be badly corroded. Bob, Jerry and Brad scavenged a three foot length of pipe, tape and wires and tools, and built a new light from one of the hi-intensity strobes that were normally used on our marker buoys during seismic drops. This light could be seen bobbing in the water for nearly ten miles. The new cylinder was too large to fit the original bracket, so it was tied to the binnacle with a quick-release knot.

By late afternoon I realized that I really must do something about a bath before dinner. During the time the English lord owned the ship, one cabin was outfitted with a bath tub. This convenience, unfortunately, had been eliminated about forty years before. The shower in the port head looked completely impossible. A salt water bucket bath on deck seemed to be the only solution. I lowered a bucket attached to a long line fastened to the deck railing. The bucket hit the water, filled rapidly, broke the line and went out to sea. By a lucky coincidence I grabbed the railing and prevented myself from following the bucket. One of the stooges came to my rescue. He tied another line on to another bucket and showed me how to lower it gently to the surface letting only a little water run into the bucket at a time. Wearing my briefest bathing suit, I lathered myself thoroughly with salt water soap. I was covered with a penetrating slippery film. Now it became a real challenge to lower the bucket for rinse water without slipping overboard. A couple of rinses later and a rub down with a Turkish towel and I was ready for a dry suit and to see what I could do about helping with dinner.

Pots on the stove were held in place by a grid of tight wires. Utensils were only half filled and I could see why. The stove followed the angle of the roll of the ship, but the level of the stew was affected by gravity. Always a different angle between

the stove top and the stew surface. Jack was slicing cucumbers for a tossed green salad, and Royd was making a blue cheese dressing. Everything was under control so I volunteered for the job of setting the table.

I quickly learned that there were unexpected subtleties in this simple task. Only one hand could be used to carry plates and cups from the galley because the other was needed to grab the nearest stable point for balance when the ship gave a sudden pitch. The crockery had to be placed evenly on both sides of the gimbaled table to maintain its balance. A hinged shelf on the forward bulkhead was lowered to make a stationary serving table for condiments and platters. A two inch railing restrained these items, but pitchers and other dishes with a high center of gravity could not be placed there. They would careen over the edge without warning in a heavy roll.

After dinner Jerry retired to his cabin and practiced Tahitian tunes on his guitar; the scientists were in the electronics cabin getting ready for the drop in the morning; the cooks were in the galley cleaning up; the watch was on deck and the three stooges disappeared to the forecabin. I was alone in the salon feeling unnecessary and unwanted. Would it always be this way? There was a large stack of games and cards. Who would play them? I propped myself up in a corner with a book but my eyes wandered around the salon where I probably would be spending a good deal of time. I hoped it wouldn't always be so void of people. The paneling was warm and friendly. The shelves contained books of all descriptions....best sellers, classics, who-done-its, sailing manuals and charts, South Sea Sages, reference books and guide books. Stored under the couch on which I was sitting were emergency casks of water, not to be opened or used except in case of ship wreck or equally catastrophic event. The opening for the diesel tanks and the light bulb storage were under the couch along the aft wall. The space under the starboard couch was filled with food, at this time bread and eggs plus such staples as peanut butter and mayonnaise. The radio was above this couch. I thought of the days when the DWYN WEN was a cruise ship between the West Coast and Honolulu. Then the salon held slot machines and roulette tables, and there was a secret compartment where contraband was hidden from the inquiring eyes of harbor officials. Scientific work had changed the interior of the salon. Now there were a dozen grey watertight boxes lashed against the walls at floor level. Each box was so set that it could be opened, materials used without disturbing the essential lashing. In one was the Zenith time signal radio. Each drop must be exactly timed to coincide with other experimental work going on throughout the Pacific. In another was an oscilloscope for checking the tapes after recovery to make sure that the data had been recorded.

One box was mine....my typewriter, typewriter paper, supplies, reference books and a file.

Royd came in and started turning dials on the radio. Soon the three stooges wandered in. Everyone was interested in learning what was going on in the world that was greater than our little ship in the Pacific. Reception was poor. Communications were garbled. The assembled group soon disappeared.

I headed for our cabin. Brad and I shared one aft: two bunks; tiny closet over the diesel tanks (my dress clothes for winter had a distinct aroma of diesel fuel when we finally arrived in New Zealand); drawers that were almost impossible to open under the bunks; my toilet case lashed to the wall. The overhead skylight was kept open at all times except during squalls. This cabin roughly six feet by six feet with more than half of it taken up by bunks, a good deal of the rest of it by closet and life preservers, would be our home for the summer.

Brad, Bob and Forrest were burning the midnight oil in the electronics cabin across, the companionway. I said goodnight and went to bed with a book but fell into a still rather uneasy sleep after a few pages.

Dawn. DROP DAY. After an all night vigil of getting the seismometers, recorders and sphere ready; a constant checking of weather, wind and sea, we were about ready. There had been some question as to whether or not to make the drop. Decision DROP!

Everyone was up early. Stan was taking early sun sights. Brad was checking time signals. The cooks had breakfast all prepared because they would be needed, and could not be scrambling eggs when the signal to drop came. Bob studied the bottom charts again. No one made unnecessary comments or conversation. The sea floor was gently contoured three miles below us. The time had come. First, out with the float.

The float was our marker buoy in the changing ocean. It is made of a two foot diameter cylinder of Styrofoam with a two inch metal rod piercing it with sufficient length above to attach an iridescent orange flag and a strobe lamp, and sufficient length below to attach a weight to keep the marker in an upright position. Fastened to this float was a three mile long nylon line that had to be fed out slowly to prevent it from tangling. At the end of the line was a heavy anchor which would sink to the sea floor to keep the buoy in a relatively constant position in the ocean. The men launched the buoy, paid out the line, dropped the anchor. The float was set and in position.

The next operation was to run toward the float and drop the instrument-filled sphere as close as possible. Stan brought the ship around. The three stooges and cooks released the boom so that it could be used as a derrick for picking up the

sphere and putting it over the side. Brad and Bob made the necessary attachments and guided the sphere across the deck and over the railing. Forrest, the key man during the drop procedure, activated the transmitter to the antenna at the last possible moment. Brad leaned far over the railing to steady the lead anchor and to make sure that the antenna did not come into contact with any of the lines and shrouds. The radio transmitter was our insurance that we would be able to locate the instrument when it returned to the surface. The sphere was lowered to the surface. It was released. It slowly faded as it sank below the waves with the characteristic glub, glub, glub.



**Chopping on the deck of the DWYN WEN next to a sphere.**

The minute the sphere entered the water the Skipper turned the helm over to the First Mate and took a sextant reading to determine as closely as possible our exact spot in the middle of the Pacific.

Now the wait began. We silently ate our breakfast. Everyone would be tense for the next four or five hours while the sphere was resting on the bottom. Would the

instrument return to the surface? Would we be able to locate it? Would the seismometers operate properly? Would the amplifiers successfully transmit the microseismic motions to the tape? Thousands of dollars worth of scientific equipment and months of preparation were resting alone at the bottom of the sea three to four miles below us. There were no lines to the sphere, as a line might jerk the seismometer and give an incorrect reading. The use of a line to the instrument had been abandoned a year before. Would deep currents below us carry the sphere off in an unknown direction? Are there inaccuracies in the bottom contour charts? Is there a hidden canyon so deep that the sphere could not withstand the enormous pressures? Might there be rocky outcroppings that would capture the sphere? The sphere was dropped as close as possible to the anchored buoy. For several hours we hovered near the buoy. We criss-crossed a few miles of the sea, biding our time until calculations told us that it was time to listen for the radio beam, scan the horizon, hope and pray.

We tried to read. We paced the deck. Time went very slowly. We ate lunch. Rarely in oceanographic research can a release mechanism be counted on completely. Historically only about fifty percent of self-contained instruments are recovered the first year. The recovery percentage increases with experience. So far, our record had been one hundred percent. Even in the early tests, every instrument had been recovered. Would this be the time that our perfect record for release and recovery would be destroyed and our results brought into the line of usual statistics? We had only three instruments on board. If one was lost, the possibility of a successful summer would become much less. If two were lost, the possibility of a double drop would become zero. If all three were lost, the summer data gathering would come to a standstill.

Two of our instruments were identical aluminum spheres each containing three seismometers set at orthogonal (90°) angles. The third instrument contained only a single seismometer. The microseismic motions being studied were Rayleigh waves, motions in small vertical ellipses, and Love waves, motions in horizontal lines. The single component vertical instrument recorded only Rayleigh waves. Due to the angled arrangement of the seismometers, the three component instruments could record both Rayleigh and Love waves, defining not only the kind of wave but also the direction of travel.

During the drop period I felt a great appreciation for the skipper and crew. They were no longer seamen, cook and engineer. They were a part of a scientific team.



**They were no longer seamen, cook and engineer. They were a part of a scientific team.**

Only four hours had passed since the sphere was dropped. However, Brad activated the radio, realizing the possibility of an early release. A short time later two of the three stooges mounted the cross bars at the top of the masts with binoculars scanning the surface for a bright orange ball bobbing up and down in the ocean chop and swell. Would that dark cloud in the distance approach rapidly and bring a squall that would make it impossible to see such a small object on the surface? The radio transmitter made searching easier but in the final analysis it was the human eye that must definitively locate it. I was at the bow. Twelve pairs of eyes were watching with deep concentration. We anxiously waited for the data filled sphere, the instrumented heart of the expedition, to appear.

Suddenly “beep beep,” the radio had come to life! Brad was in the chart house calling out directions which were transmitted by Bob to Stan at the helm. Quick calculations and our course was corrected to the signals from the transmitter. They came in loud and clear. We searched. We looked. The signals weakened. We had lost the beam. We knew the sphere was on the surface within a mile of us, but we had missed it. Stan brought the ship around. The signals started again. We could tell



that the package was somewhere to port. Our eyes were aching. Our muscles were tense. Our hearts were in our throats. Then, from the top most mast.....

“That she is!”

Everyone sprang to action stations! George at the top of the mast kept his binoculars focused on the sphere, following it as it dropped into a trough or rode the crest of a wave. Stan followed George’s directions and the directions from Jack forward on the deck. We came along side. John sprang into action. As a former La Jolla surfer, he was always looking for some excuse to dive in the sea. In he went, swam to the sphere, grabbed the attached line and handed it to Brad balancing from the railings.



**John swam to the sphere and grabbed the attached line.**

The boom was swung out and dropped to pick up the sphere. Brad removed the antenna while it was still an arm’s length away from the ship. The sphere was swung on board and lowered into its cradle. Only then did smiles and relaxation come over the crew. “We did it!” was the call from all of them. But, the end of the long nervous

strain was not over for the scientists. The sphere had returned and it was on board, but did the instruments work properly?

The skylight over the salon was removed. Lines were attached to the sphere. Each man took a line and gently lowered the sphere into the salon where the scientists would open it up. Only then would we know of the success or failure of the experiment. The sphere was opened. It looked OK. The tiltmeter was checked - it showed perfect positioning on the bottom. The tapes were removed. The oscilloscope was brought out from its watertight grey box. The tapes were run. The first seismometer was operating satisfactorily, the tape gave a good record. The second, the same. Now for the third. With fingers crossed, we waited. This record, too, was strong and clear. Now even Brad and Bob and Forrest smiled.

The instruments were cleaned; the tapes were refitted in the recorders; the sphere was assembled and returned to the deck. Another delicious meal was prepared by our master chefs. Camaraderie and good feeling prevailed. The crew hung around the salon after dinner and even included me in the evening's wild game of monopoly.

In the morning we saw a few porpoises. We ran forward as porpoises from all over our area of the Pacific gathered to lead our ship for the better part of an hour. There must have been at least two or three hundred of them. No one on the ship had ever seen such a large group. As many as six or eight of them would jump together, clearing the water by a couple of body widths. Big Jim tried to lasso one of them. He got close enough to have one go completely through his lasso.

The three stooges, George, John and Big Jim, were so much alike it took me several days to tell them apart. All tall and well built; all blond; all with beards and uncut hair; all wearing identical shark knives strapped to their belts; all in their late teens; all on their first trip into the South Pacific. As time passed I got to know their backgrounds. George had gone to sea after a year at college. Big Jim had just completed four years in the Marine Corps. John found the sea more inviting than flag pole painting.

The most pleasant spot on deck was at the helm. I spent a good deal of time with the man on watch, learning about the sails, navigation and following course. Finally the hoped for question came.

"Would you like to take the wheel?" I was delighted. This meant that they didn't distrust me completely. There was much instruction. The watch didn't leave my side or take his eyes away from the compass and sails. By the time a few days had passed, I had become proficient enough that I was left at the helm alone while the watch went below to bring us tall glasses of cold lemonade.

Life on shipboard became relaxed and lazy. Up early, breakfast, a nap and reading or sunbathing took care of the morning. After lunch more of the same until it was time for a bucket bath. I soon progressed to a bucket shower. I would lather myself up in the usual way and then one of the stooges would spray the hose on me for a rinse. I had also advanced to the point of making myself useful. As soon as the table setting job was mastered, I started clearing and washing dishes. Dishwashing was a new experience. A skyscraper window washer had nothing on me. I wore a belt fastened to the drainboard on each side of the sink. Without this support when hands were wet and soapy, I would be completely covered by bruises from being thrown from one side of the galley to the other with each roll of the ship.

Big Jim occasionally traded his watch for the cooking duties. The first time, he was in the galley when a heavy sea hit the ship. Noise of pots and pans being thrown around, and the most violent profanity I have ever heard. I quietly went to the galley, "Could you use a couple of extra hands?"

"Could I!" I became Big Jim's regular assistant. His specialty was Italian food, spaghetti, lasagna, pizza. On this 'dry' ship, we broke out a bottle of red wine to go with his meals. We even put candles on the table and made them very gala occasions.

General lethargy overtook everyone except the men on watch. The heat, humidity and constant motion were very enervating. Forrest spent most of the time on his bunk or sitting in the salon staring into space. We rarely saw him except at meal times and sometimes not even then. He came to life only immediately before, during and immediately after a drop, at the times when his presence was critical to the success of the expedition.

On day I asked Forrest what he thought of sailing.

"It's the most uncomfortable, miserable, inefficient means of getting from one place to another ever conceived by man!" This was the longest and most energetic statement made by Forrest during the entire summer.

The skipper said Forrest reminded him of something that happened in his home town. "There was an attractive waitress at the Inn, and she was very quiet. No one was ever able to get her into a conversation. Ben, a farmer from out of town, was just as quiet and always went to the Inn when he was in town. And what do you know, they got married. Everyone in our town had one big question. How were their children ever going to learn to talk?"

We had been at sea for about a week. The drops had all been successful, though we almost missed a couple. In one drop, the O-ring between the two sections of the sphere was imperfect. The sphere rose to the surface but just barely broke water. Good luck and 20-20 vision were responsible for its recovery. There was a

pint of water inside, not enough to damage the instruments or destroy the records, but almost enough to prevent the sphere from returning. Another time the winds had been so fresh and strong that we overshot our drop spot by many miles and had to back-track until the proper contours were below us.

We knew we were approaching land. For two days land birds had been flying around the ship. Ahead on the horizon were an accumulation of white clouds, a sure sign that there is land below. It should be Palmyra. George was on the spreaders at the top of the main mast. "Land Ahead!" I hurried up the rigging. From the top of the mast I could see a dark line on one section of the horizon.

Down in the cabin, we spread out the charts and the Pacific Island sailing directions. We all read and studied everything we could lay our hands on regarding this rarely visited atoll that was discovered by the American ship PALMYRA in 1802. The atoll is composed of many small islets lying on a barrier reef which encloses three distinct lagoons. These islets are low; the highest is about 6 ft. above sea level, and covered with coconut and other trees reaching heights of 60 to 100 ft.

Every few moments we left our charts and reading and looked toward the ever increasing piece of land. First it was just a dark line on the horizon with a dense cloud cover; then it was a dark region thrust above the ocean; soon the darkness disappeared and turned to a subtle green; eventually individual trees and individual islets were discernable. We could see the white line of breakers at the edge of the reef. The reef extended out a great distance from the edge of the land masses.

"The barrier reef is about 8 miles long and at the eastern extremity of the atoll it extends about  $1\frac{1}{2}$  miles and its extremity is broken up into a number of detached coral patches. At the western end of the atoll, a sunken reef extends about one mile westward of the barrier reef. The sunken reef contains many small coral patches and heads, either completely or nearly awash, through which it is almost impossible for even a small boat to navigate. At the eastern end of the atoll a bank with depths of about 4 to 6 fathoms extends from the barrier reef eastward to a distance of about 3 miles. Heavy blind rollers, breaking occasionally, render it impossible to accurately define the edge of the bank, but it descends rapidly to depths of 100 fathoms and soundings give no warning of the approach to this danger." We read from the Pacific Islands Manual.

We could see the edge of the barrier reef and the breaking of the ocean swells when they reached that obstacle. High over the awash coral we could see a wrecked ship that had ventured too close to the reef, or had been caught in a sudden squall, or whose crew had made some incorrect calculation.

"A dredged channel leads through the barrier reef on the southwestern side of the island and is the only entrance. Entrance should not be attempted unless the

weather is clear, sun shining, tide at flood and the wind is less than 10 knots, to facilitate identification of the channel limits and reef edges. The currents set across the channel from southeast and are especially strong southwestward of Sand Island.

“Inside the channel there are depths of less than 14 ft. on the continuation of the channel. Shoal spots of less than 10 ft. exist in West Lagoon.

“CAUTION - Shoaling is reported in the entrance channel of West and Center Lagoons, and no attempt is being made to maintain their former depths. Most artificial aids of navigation have been destroyed or have badly deteriorated.

“PALMYRA FACILITIES - a 400 ft. ship’s pier and boat pier are located in West Lagoon. The ship’s pier was reported in poor condition in 1951.”

With this description of the only navigable channel to the Palmyra lagoon, the skipper made a wide berth of the reef until our instruments told us that we were in the correct position for the entrance. We tried to make radio contact with Gordon Groves and Jay Carr, the two men we knew to be living on the otherwise uninhabited atoll. Our radio again proved unreliable. We had to go ahead without aid from shore. Again twelve pairs of eyes were scanning the breaker line looking for the opening. All we saw was an unbroken wave pattern at the edge of the reef. We were less than a mile from the reef at this point so the 1st Mate went over with the shore boat to see if he, on a closer approach, could locate the channel entrance. We followed him as he cruised unsuccessfully back and forth along the breaker line. He was carrying our citizens-band radio to keep in contact with the ship.

“You’re going too far to the right. Reverse direction. OVER”

No response, nor did he change direction.

“Hey, you guys, not so far. It’s the other way. OVER”

No response.

“You blank blank blankedy blank. OVER”

No response. They obviously did not have the receiver turned on. The skipper was beginning to get quite irritated. I should have brought ear plugs!

“Shore boat to DWYN WEN. We can’t locate opening. OVER”

“Of course you can’t, it’s off to the left. What in the blank blank blank do you think you’re doing? What’s the blank blank idea of leaving the radio off! OVER”

“I see a marker buoy!” John was on the spreaders. The buoy was about halfway between the edge of the reef and the lagoon. By lining up the World War II radio towers and doing some quick calculations, the skipper was able to determine where the channel entrance must be. The next questions: Was the buoy still in position? Had wind and sea and weather relocated this marker on which we were relying? The channel had not been surveyed during the past ten years. And far more serious, had shifting sands and live coral filled in the channel so that it was no longer

navigable? A sudden tropical squall came. Would we have to lay to and wait until the next morning to attempt the channel? It was frustrating to see land so close and so inaccessible after many days at sea. But, the storm was brief. We headed for the channel.

As we approached, the three stooges went over-board with flippers and face plates to watch that we kept our distance from either side of the coral channel. The 1st Mate was in the shore boat to lead the ship. The skipper kept a gentle hand on the wheel. The channel was difficult because of uncertainties and its very narrow width. However, he negotiated it without a scratch.

The stooges came on board, and we headed toward the dock that had been reported in very poor condition in 1951. The ship no longer rolled but slid across the calm surface of the lagoon. The lagoon seemed to be surrounded by low land covered with dense undergrowth and great stands of coconut palms. We did not recognize the flowering trees. They seemed to have huge white blossoms. A large bird flew to a blossom which moved in response, and we realized that these were not flowers at all but hundreds of down-covered booby chicks.

A few hundred feet from shore was a large rusty anchor buoy. Should we tie up here or go into the dock? While we were debating this question, we saw two figures waving from the dock. They were heavily tanned, full bearded, barefoot, one wearing swimming trunks the other a lava lava. We waved back. The 1st Mate headed straight for the dock in the shore boat. These two men had been on the atoll for more than a month. One was a geophysicist, the other a ham radio operator, both part of the Wave Attenuation Study Project. We were bringing them letters and pictures from home, fresh food, and equipment.

As we waited for the shore boat to return with Gordon and Jay, I asked the skipper. "Is it always this exciting to make a landfall or do you get used to being alternately on land or at sea?"

"A land-fall is always exciting, but the real thrill comes when we have brought the ship through a new channel."

Gordon and Jay climbed the ladder and were on board. Where was the best place to dock?

"No choice, tie up to the anchor buoy!" Gordon answered immediately.

Jay explained. "The ship that brought us in here tied up to the dock. A sudden gust rammed her against the pilings and badly damaged the ship down almost to the water line. It took almost three weeks to put her back into sailing condition."

"Besides, the dock is infested with rats!" We had no desire to add another rat to our shipboard family. We had picked one up on the dock at Kailua and had been trying to outsmart him ever since. He, or she, was still with us. We did not want to

take any chance of going into the rat breeding business. So without delay, we tied up to the anchor buoy.

As we were securing the ship, two large black tipped sharks circled around us. The three stooges stared, their faces fell.....they had been looking forward to doing some skin diving in the lagoon but now it did not look inviting.

The ship was secured. The shore boat was ready. Let's go! Not yet. Brad commandeered the shore boat and carefully loaded the land station equipment. Measurements were the purpose of the sojourn on Palmyra. The scientists climbed on board. There was room for one more person.

“Want to come along, Marge?”

“You bet!” I climbed on board and was on my way to the Ghost Island of the Pacific, Palmyra Atoll.

## CHAPTER III GHOST ISLAND OF THE PACIFIC

The shore boat was full. I balanced the land station batteries with one hand and myself with the other. My airline bag lay at my feet packed for a night ashore at the 'Palmyra Hilton.' My evening "wrap," a sweat shirt, drooped over my shoulders.

We did not land at the dock but at a concrete ramp extending several feet into the lagoon. Brightly colored fish flashed away as we approached shallow water. Stan lashed our emergency strobe light on a post by the ramp, to mark the place at night.

My first step on land was not the rolling gait of the sailor. Land felt firm and solid beneath my feet. Ahead of us loomed a deserted warehouse, to the right large water tanks and another dilapidated building. To the left I saw a tangle of lines in a badly sagging condition, but I didn't have much time to look around. The first order of business was to set up the land station.

On the summer seismic expedition it was important to take simultaneous measurements on the ocean bottom and on land in order to compare the frequency and amplitude of the wave patterns. We wanted to learn whether the two sets of data were initiated from the same source or whether they were unrelated.

Gordon and Brad discussed the proper location for the station. It must be stable and protected from wind and man made movements. Gordon suggested the Guard House over near the air strip. Guard house? Air strip?

"Let's get this show on the road!" Gordon and Brad carried on an extensive conversation about technical matters while they transported the equipment. I followed along with my share of gear but my mind wandered to non-scientific concerns. We passed some overflowing water tanks. The pure sweet fresh water was running off into the lagoon. It was all I could do to continue with my appointed task and not stop immediately for a lingering shower. An open door of a small building revealed four white porcelain toilets. The wind rose suddenly, and another rain squall struck, drenching us and our equipment within seconds. It let up soon, and evaporation dried us almost immediately; and then we were wet again from perspiration and the humidity.

We reached the Guard House and entered. There was a great scurrying of rats disappearing into holes and crevices. A rat-chewed mattress on a broken rusted bed and an antiquated refrigerator were the only furniture. A few high windows gave the tendrils of the encroaching jungle an entry for attacking and recapturing this outpost. By flashlight Brad set up the land station and adjusted the intricate mechanisms and set the roll of tape. We left to join the rest of our shipmates who by now had come to shore.



“Stay back by the road, Marge, John’s taking a shower.”

“I found a jeep!”

“Do you know there’s a theatre over beyond the Hilton!”

And from Brad, “Everyone please stay at least 100 yards from the Guard House at all times!”

“Do we need any more anchors for the spheres? There’s enough scrap iron around here to sink the whole DWYN WEN!”

“The airstrip must be at least a mile long. Do you suppose a plane could land without tangling in the weeds?”

“Anyone for some fresh coconut milk?”

From our algae expert, “I’ve never seen any squishy stinky algae like this before.”

“Hey John, I found a couple of bicycles!”

“There must be at least a hundred rat infested beds in the barracks!”

“You’d better not go over there Marge, they didn’t know how to spell.”

The area had obviously been a military base, but surging vegetation and jungle rot had engulfed most of the buildings and overrun the roads so completely that few details were recognizable. I recalled the one sentence in Oliver’s book about this place. “Palmyra Atoll was a major transport station during World War II.”

That was twenty years ago. How many people had been here? What had they done? Were they ever under attack? How often had people been on the island and who were they? Had there ever been a Polynesian settlement here?

Jay was busy at the radio giving mid-Pacific weather reports to the weather station in Honolulu.

Gordon was in his laboratory recording the attenuated ocean swells as they passed Palmyra on their path across the Pacific. This station was one of six set up along the great circle route from Antarctica to the Arctic. The Swell Attenuation Study was an experimental program that worked hand in hand with the seismic program. For many years, Dr. Walter Munk at the Institute of Geophysics and Planetary Physics in La Jolla, had been interested in the action of the waves across the Pacific Ocean. For the first time an attempt was being made to track the ocean swells across the Pacific. The large storms that originate around Antarctica at the southern end of New Zealand, during southern winter, create wave swells that travel across the Pacific, passing the low lying atolls, volcanic islands, ships at sea and finally reach the other end of the Great Circle in Alaska. Wave stations were set up at six points along this route: Cape Palliser, New Zealand; Vailoatai, American Samoa; Palmyra Atoll; Oahu, Hawaii; on board the FLIP (Floating Instrument

Platform), anchored in the open sea halfway between Hawaii and Alaska; and finally at Yakutat, Alaska.

Ocean waves and swell produced from distant storms are attenuated as they travel from their origin. A pressure sensing device, which is planted in shallow water to measure the fluctuating pressure on the sea bottom, is the primary instrument in the swell study. Using this device, and computers to unravel the maze of information, direction of travel of ocean swell can be determined. In fact, directional accuracy within a few degrees can be attained, even when the swell is only tenths of an inch in height.

One aim of the summer study was to discover relationships between land and ocean bottom microseisms, and the surface swell activity. Our first simultaneous recordings were being done here on Palmyra. The sphere was dropped to the depths of the lagoon; the instruments in the ocean surf sent their data to punch the tape in Gordon's lab.; the magnetic tape in the land station recorded land microseisms.



**The village on Palmyra.**

This was not the time for interruptions. So I stayed in the village to get the lay of the land and to investigate our accommodations for a night on shore.

The village consisted of six concrete slabs, with battered and torn canvas tents, open on all side to wind and weather and rain. I dropped my bag off at the Hilton. I knew it was the hotel because on a tattered piece of canvas the words 'Palmyra Hilton' were written in large block letters of fluorescent orange paint. Inside were four army cots, each draped with a canopy of very fine mosquito netting. a rusty folding chair completed the furnishings.

Gordon's tent radiated color, warmth and hospitality. His brightly colored lava lavas hung from a line stretching the full length of the platform. The recording instrument made a cheerful click click as it punched the data tape.

Jay's tent was more austere. It also doubled as the first aid station and medical supply depot.

The center of activity on Palmyra was the radio shack. The slab and tent were the same as the others. Along one side stood the massive ham radio station with the call letters W6FAY prominently displayed. Regularly scheduled calls were made to the other experimental stations. Weather reports were broadcast daily. Honolulu was on the air when I entered. "What is the present weather condition on Palmyra?"

"Just a minute, I'll look." Jay wiggled his toes in the puddle of water under the radio bench. "Raining again, wind from the southwest, not much change."

This tent also included the commissary, dining room and large rat proof storage cupboard called the 'Bank of America.' The stock of food did not look too appealing! Canned goods exclusively, since fresh food was unavailable and dehydrated foods could not withstand the constant high humidity. Our DWYN WEN dinner invitation was readily accepted.

Royd and Jack outdid themselves.....a seven course Chinese feast. They had been hoarding specialties from Kailua for just such an evening. We gorged on sweet and sour pork, bean shoots, chicken almond, chow mein, melon soup. Over coffee and cigars, we learned the story of Palmyra.

Legend had it that a pirate ship laden with Spanish gold made land-fall here in the days of lucrative trading between the orient and the old world. The seas were infested with cut-throat pirates and buccaneers. Mutiny and disease were incipient crew mates on every ship. One ship hove to, while a party went ashore to investigate possible sources of fresh food and water. Neither was available; nor was there a native population. It was the perfect place for burying the heavily laden chests of wealth to be retrieved at a later date. Perhaps the galleon foundered on Kingman Reef or some other shoaling waters, or was dashed about and sunk in heavy seas or was boarded and burned.

The ship was sunk but some of the crew returned to distant shores and reported the store of Spanish gold on Palmyra. Perhaps the ever growing atoll has locked it permanently in its clutches; perhaps the bulldozers building the airstrip have buried it under tons of dead coral; perhaps it is just below the overgrown jungle or under a few inches of sand in the lagoon.

Anthropological research has never uncovered a Polynesian settlement on this atoll. However, since it is the farthest north of the Line Islands, it is safe to assume that during the migration from the lower Line Islands and Tahiti to the Hawaiian chain, Polynesian canoes stopped here briefly. Perhaps they found the atoll too wet and uninviting to support a settlement so they continued on to the islands a thousand miles to the north.

The first recorded history of the atoll comes from the log of the American ship PALMYRA which discovered the atoll in 1802. It was not until 60 years later that Palmyra was claimed by any country. Formal possession was taken in the name of the United States of America by an agent of the American Guano Company, but no record exists, that America ever recognized the claim. Since no nation claimed this small piece of real estate, two Britons petitioned His Hawaiian Majesty Kamehameha IV for permission to add Palmyra to the Kingdom of Hawaii. On June 18, 1862, by royal proclamation Palmyra became “part of the domain of the King of the Hawaiian Islands.”

Notwithstanding these claims the atoll was annexed to Great Britain in 1889. This claim was apparently never officially ratified, although Palmyra was mapped as British until as late as 1910. Finally, upon annexation of the Hawaiian Islands by the United States in 1898, the atoll became a part of the United States by its specific mention in the President’s message to Congress.

Honolulu became aware that British interests had designs on Palmyra so the cruiser WEST VIRGINIA quietly slipped out of Honolulu and returned a few weeks later with the announcement that they had taken formal possession of Palmyra in the name of the United States on February 20-21, 1912.

Until Hawaii became a state, Palmyra was incorporated in the Territory of Hawaii and governed from Honolulu. The atoll is now under the administration of the Department of the Interior.

The ownership and title to the islands passed through many hands. Colonization was attempted. Coconut trees were planted and copra production tried sporadically. But the atoll was not practical for colonization or for copra. The distance from markets and the cost of transportation were too great.

In 1912, Judge Cooper of Honolulu started the long legal process of examining titles, and filed petition for title. Notices were posted, not upon the land, which was

too far away, but upon the Honolulu Court House. Later all but Home Island was sold to the Fullard-Leo family who was interested in the commercial fishing, coconut crop and eventual tourist development of the atoll. The 1929 depression and, later, World War II discouraged these developments.

Palmyra has long been of interest to the scientist. Joseph Rock made one of the first botanical surveys of the area in 1913. <sup>1</sup> Since that time not only have botanists found the area interesting, but also ichthyologists, ornithologists, zoologists, marine biologists and oceanographers. The flora and fauna of the atoll are well documented, as are the toxic reef fish.

During the early 1930s not much went on at Palmyra. An occasional ship passed or stopped. The sampan ISLANDER from Hawaii was the only frequent visitor.

The first great change to this isolated atoll was caused by a piece of paper, the Hepburn Report, dated Dec. 27, 1938. As a result of this report Palmyra was fortified.

Palmyra was a strategic location, and the U.S. Navy commenced construction of an air base in 1939. At that time Edwin H. Bryan, jr. wrote “The atoll has been declared a U.S. Naval defense area and all foreign public and private vessels and planes are prohibited. It is to be hoped that the construction of a naval air base will not destroy the natural beauty and scientific value of this, one of the most interesting atolls under the American flag.”

The modifications to the contours of the atoll were tremendous. All of the major islands of the atoll ring were joined by a roadway which was created by bulldozing many small islets together and using fill from the lagoon. The two western lagoons were dredged and merged into one to create a seaplane runway. Several of the larger islets were compacted and leveled for the construction of a 6,000 ft. land plane airstrip. A causeway was constructed across the reef-flat to accommodate the beacon and radio towers. A channel was dredged for a ship entrance into the lagoon, creating another island to be used as a fighter airstrip.

With the outbreak of war, fortifications were rapidly completed. Bunker, gun emplacements, ammunition storage vaults and pill boxes were built on all parts of the islands facing seaward. Barbed wire entanglements were strung across all the reef-flats and vegetation was leveled to provide cross-firing ranges. About two thousand men occupied the station. Palmyra was a very small station, and it quickly slid into the quiet backwaters of the war as our fleet moved farther and farther toward Japanese home waters. This is not to say that Palmyra was unimportant – in fact she was vitally important in protecting the Hawaiian Islands in the early phases of the war. One reason that the initial attack on Pearl Harbor came from the north

was the Japanese fear of detection by Palmyra and other outposts to the south. The Japanese shelled Palmyra early in the war but made no attempt to occupy it.

The sudden end of the war brought the period of heavy population to a dramatic close. Shortly after the close of hostilities in 1945 it is said that a carrier came by one day, and loaded nearly all the homesick sailors and GIs aboard. The departure was so sudden that typewriters were left with unfinished letters in the rollers, and washing machines in the post laundry clogged with dirty clothes.

The Navy pulled out at the end of the war, leaving behind the remnants of a once bustling transport station. Remaining on the island was one civilian worker, Otto Hornung, who became known as the Hermit of Palmyra. For the next several years Otto was the only resident. Except for a few trips to Honolulu, he did not leave the island. He acted as overseer and watchman for the owners.

The Civil Aeronautics Authority took over the atoll in the late 1940s and operated a radio beacon and weather station for a few years. Employees and families numbering several hundred persons raised ornamental plants and planted vegetable gardens. Otto saw the CAA come and go. Occasionally a few scientists would stop by to study and take samples of poisonous fish and marine algae, leaving after a short visit to complete their research in their laboratories at home.

The International Geophysical Year in 1957-58 included a world wide experimental program. Otto became involved. He went to Jarvis Island, one of the small islands along the equator, to act as an observer for IGY. He never returned to Palmyra. He suffered a fatal heart attack on Jarvis and was buried there with full military honors.

IGY observers were sent to Palmyra in 1957. A young couple, Jack and Leah Wheeler, who lived on their boat in the lagoon, sent reports of their observations by radio to Fanning Island. Except for a few weeks when Leah was taken to Fanning to give birth to their second child, they lived on Palmyra for the year.

IGY marked the start of the use of Palmyra by the physical scientists. In 1962 a transient population of a few dozen men spent almost three months on Palmyra under the Department of Defense. They set up and operated a tracking station for the atomic bomb operations being held near Christmas Island farther south in the Line Island Group. The Palmyra station was one of many established by Joint Task Force EIGHT for measuring background radiation levels and collecting environmental samples.

Gordon and Jay had started to tell us about their own trip to Palmyra on the MALABAR VIII when Brad noticed the time. Ten p.m. was zero hour for the simultaneous measurements across the Pacific. The scientists rushed off, followed by the crew. I stayed on board with Jack and Royd to help clean up the galley.

Later that evening we returned to shore across the calm lagoon, against a background of silhouetted palms, a star sprinkled sky, the flap-flap of wavelets gently caressing the shore, the fluttering of the wings of a bird, and the splash of a fish breaking water. We felt completely alone. For thousands of square miles, it seemed, there was not another ship, another island, another human being. We guided the shore boat toward the flashing strobe and made our way to the radio shack.

At first we could hear only the humming of a voice. As we approached, our crew cast elongated shadows from the dim light hanging over the radio station. Gordon hunched over the controls....heavy set, black bearded, foreign looking, speaking a strange tongue. The only word we recognized was the international conclusion to each message "OVER." Gordon was speaking to friends and relatives of his Gilbertese wife.

Jay returned to the controls. He made contact with a ham operator in San Diego. "Want to talk with anyone in the San Diego area?"

"Yes!" was my immediate answer. "Would it be possible to talk with Bari?"

"Easy, what's the phone number?"

I didn't remember. But the name and address of the people with whom she was staying, a quick perusal of the phone book by the San Diego ham, the dialing, the ring, the answer. The explanations of ham phone patches seemed to take a long time....and then.

"Hello."

"Hi, is Bari there?"

"She's out for the evening." Then I remembered this was the night of the Midshipmen's Ball. We had planned the dress and the accessories together a month before. I was disappointed, but glad to learn that she was well and happy and enjoying her job. I bubbled on for some time on the beauties and excitement of sailing the Pacific. Others on the crew made contact with families and friends. Royd's father was a ham in Chicago. The San Diego ham contacted a Chicago ham who in turn contacted Royd's father. During the evening we learned that Royd's friend Melanie was a beautiful as ever, that Jerry's income tax return had been sent to Sacramento and that John's family was well and happy. I noticed that none of the fellows called a special girl friend. I realized why, when I thought of the difficulty of talking about my daughter and personal business with a full audience and countless airwave kibitzers listening to every word.

Jay continued with his ham contacts....the United States, Europe, Asia, ships at sea; by the end of the evening ham operators all over the world knew that the DWYN WEN was at Palmyra and that she set a very fine table.



**Royd contacted his father, a ham operator in Chicago.**

We said goodnight to the crew as they headed back to the ship. Brad and I retired to the Palmyra Hilton. At night the island comes alive with crawling things. Hundreds of hermit crabs covered the platform of our tent, and land crabs scurried across the floor. Biting insects zoomed to the attack.

We climbed into our cots and tucked the netting snugly around the mattress. It was raining again. Perspiration kept me almost as wet as if I had been outside. However, I did fall into a sound damp sleep almost immediately.

Dawn. Today I would look around and see what the atoll was really like. We ate breakfast with Gordon and Jay from the limited larder in the radio shack. It was easy to see why a meal on board the DWYN WEN was such a treat. Canned fruit juice, canned brown bread, canned bacon and instant coffee filled the empty spots but did not have the appeal of the freshly brewed coffee, cinnamon rolls, scrambled eggs and sausage available on board ship. Gordon and Jay were basically gourmets, but they were not able to add native protein to their meager supplies. The meat of the



crabs, who live on a diet of coconuts, was too oily for frequent consumption, and the reef fish were known to be toxic.

One anachronism on the atoll was a Rhode Island Red chicken, BETTY. No one knew from where she had come, how long she had been there or how she had survived. Gordon and Jay fed her daily from left over K-rations that dated back to the war, but they never thought of eating her. She was company. She was a friend. We first met Betty when she strutted into the radio shack to listen to the broadcasting; she attentively watched the thousands of feet of tape coming from the wave recording apparatus; but she never ventured near the Guard House while the land station was there.

During the morning the crew and I explored Cooper Island, which had been created in 1939 by bull-dozing many small islets together and using fill from the lagoon. This is now the largest island, and an airstrip extends for its full length. The airstrip is still useable. Twice during the summer a small plane from Honolulu landed with supplies, equipment and mail for the resident population of two. Dense tropical growth encroached on the runway, and wherever the asphalt had decayed, a solid stinky mass of Palmyra algae appeared. A bulletin board listing the scheduled flights hung from a crippled control tower. The last scheduled flight had left the island more than twenty years before.

“I’ve found another guard house!” came from John, who was ahead of us. We could see him standing on a vine covered mound a few feet higher than the surrounding jungle. We ran to investigate the structure which was half underground. The walls were of massive concrete inlaid with pipes and valves. There were no windows. We concluded that this must have been a storage vault for the hi-octane gasoline. Many years ago a coconut had fallen on top of this structure. Now there stood a forty foot palm crowned with a generous crop of fresh green coconuts. We sampled one and decided there is no more refreshing drink in the world.

The atoll was an unofficial bird sanctuary. There are no natural enemies. We were always followed on open ground by hundreds of large frigate birds, gannets (or boobys) and fairy terns.

We crossed the island by hacking the vines away with machetes or walking on top of the waist high tangle of twisted broken trees. We came to a less densely covered area that looked as if it might have been a path and followed it to a one-room wooden building with a tangled mass covered door opening. The floor was almost completely decayed; the walls tilted at rakish angles; the roof was held in place only by the dense foliage attaching it to the surrounding jungle. Rats and crabs scurried as we cautiously made a partial entrance. This might have been a photographic lab. Rotted legs had collapsed under one end of the work bench;

remains of acid-stained pans might have held photographic developer; a few nails not yet falling from the walls might have supported a line for drying negatives.

We continued chapping our way through the underbrush until we finally reached the ocean side of Cooper Island. The hundred yard distance had taken us more than an hour to negotiate. Our arms and legs were covered with cuts and scratches. The reef extended a quarter of a mile at this point. It was low tide. In some spots the live coral was covered by just a few inches of water. Upon turning over a piece of coral we found dozens of the tiny money cowries used by the Polynesians in making the beautiful shell leis. Empty cowries, cones and killer-clams lay everywhere. The gentle waves over the reef at high tide had washed in thousands of shells. No one had been there to scavenge them for twenty years. I could not take a step without crushing the delicate purple sea urchin shells. I started collecting but soon gave up. It would have been impossible to carry even a small percentage of those I would like to have added to our collection at home.

The military preparations for the attack that never came were very much in evidence around the outer reefs. Massive concrete gun emplacements were spaced every few hundred feet, some now marooned on the reef. Some were overgrown a few feet from shore. The ever changing contours of the earth and the continual building up of the reef have reshaped the shore line so that the concrete boxes are found in unnatural places and at distorted angles.

The quarters for the men who had manned these pill boxes lay a few yards inland. Built of wood, they have all but returned to the earth. Only a few floor boards, an occasional wall or a twisted rusty army cot remain.

Each of us carried a piece of cheese, some raisins and a few crackers so that we would not have to go back to the ship for lunch. We followed the coast and circled back toward the settlement. The war time jeep road had almost completely disappeared except near the settlement where we could occasionally detect evidence of recent use. The IGY recording stations and the nuclear tracking stations must have been set up in this area. The paths from this area back to the village were well-defined.

We had reached the hub of activity of twenty years ago. The barracks were set back in a coconut grove. In front was a cleared area with a hard surface that had been used for tennis or volley ball. The standards were rusting away but still in place. The movie theatre must have doubled for variety shows as there were dressing rooms in back. Perhaps screen personalities had entertained there. Other buildings around this area could have been officers' quarters, post-exchange, post office. They were far too deteriorated in 1963 to tell just what their use had been. The Officers Club occupied the most beautiful spot on Cooper Island. It faced the lagoon with a

wide, once screened in, verandah looking across the lagoon toward Sand Island and the sea.



**The concrete boxes are found in unnatural places and at distorted angles.**

At the center of this once active Major Naval Transport Station stood the dock, the wharf and the warehouse. Water tanks still collect rain water from the roof of the immense warehouse building. Rain is the only source of fresh water, and 180 inches per year was enough to supply the war time military population and subsequent transients. The dock was long enough to accommodate several large freighters at once. This is the dock that had been reported in bad condition in 1951 and that Gordon had recommended against our using. Footing was a little precarious as we avoided the broken and missing planks.

The warehouse itself was at least two hundred feet long. It still contained spools of cables, drums of oil, rope, stoves, refrigerators, pipes, winches, loading equipment. The office, a wire cage near the main entrance, must have seen very busy days during the war when supplies and equipment arrived by ship or plane and had to be duly inventoried, requisitioned and catalogued before they could be loaded for

the onward journey. In this enervating sleepy tropical atoll, one could imagine a young ensign tearing his hair to meet plane departures, shipping dates and red tape. When Palmyra was deactivated the necessary files were removed and placed in the archives in Washington. Everything that was not essential for navy records was abandoned on the island.

Returning to the village, we found unexpected refreshments just outside the mess tent. Brad and Gordon, after completing their measurements, had harvested the salad of kings, Heart of Palm. This is a rarely eaten delicacy since a palm tree must be destroyed to reach the heart. At the more expensive restaurants it is possible to order a Heart of Palm salad for an exorbitant price. Here on Palmyra the young trees were so numerous that it was impossible for all of them to grow to maturity. Taking a tree from a thick clump did not destroy the natural beauty. Some time ago, a row of palms was cut down to give a clear view of the channel from the village. This area was called Heart of Palm Farm. The trees have already grown back. To harvest heart of palm a mature coconut palm is felled. The fronds are stripped as far down as possible. The outer leaves are stripped away, to expose the heart where the immature palm fronds are in the process of formation. A stalk about two inches in diameter and about two feet long is removed. These immature fronds fall apart like a fan. They are very pale green, as crisp as celery, but as tender as the inner leaves of butter lettuce. The taste is difficult to describe. It is not sweet or tart; it does not have a pronounced flavor nor is it bland. It might be likened to ultra thin slices of water chestnuts marinated in coconut milk. We ate great pieces of it, knowing that never again would we have a chance to gorge ourselves on such a delicacy.

It had been a full day, and we were ready for the quick easy supper that was waiting for us on shipboard....two-inch thick T-bone steaks barbecued on deck in the anchor pans of the seismic spheres. Brad agreed that the time had come to break out the case of beer which had been chilling in the refrigerator since early morning. The condensation on the chilled bottles enhanced our enjoyment.

When the evening rain came we grabbed what we could of the dinner remains and headed below to the salon. Washing dishes was easy when we were anchored in a calm lagoon. After dinner a mock serious discussion of island politics and village officials enlivened the coffee hour.....

“I nominate Gordon Groves as Mayor of Palmyra.” The nomination was duly seconded and carried by an enthusiastic voice vote. Jay was unanimously elected Postmaster General. Now that we had officials, I broached a frivolous project....cancel stamps with a Palmyra postmark.

The island is an American possession, so ordinary 8¢ airmail stamps would suffice. Concentric circles made the outline of the cancellation, a cross bar made

room for the date. PALMYRA ISLAND - POLYNESIAN PARADISE appeared at the top. G. GROVES - MAYOR J. CARR - POSTMASTER GENERAL appeared at the bottom. As each cancellation was finished it was signed by Gordon and Jay. We cancelled stamps on eight envelopes. Four of them were eventually delivered to the post office at Pago Pago, American Samoa, as mail from Palmyra, and finally reached their destinations in La Jolla and Chicago. These cancellations are unique in our daughter's sizable collection.

The best and only hotel in thousands of square miles was waiting for us. We were becoming quite attached to it. The hermit crabs became our friends; the fast moving land crabs the villains....that is until we met the coconut crab.

I lingered over coffee the next morning before doing the washing. The washing machine was rather primitive but most effective.....a large garbage can filled about a third full of rain water and a liberal supply of detergent. The plunger and agitator was a long handled plumber's helper. My aching back and tired shoulders were forgotten when I produced the whitest line on Palmyra. I admired it on the line for a moment and then the rain started. I took it down and finally dried it in our suite at the Hilton. My one remaining problem was how to get it back to the ship in a dry condition. Mission was accomplished during a prolonged dry 'spell of almost three-quarters of an hour in the late afternoon. I was fed; the washing was done; I was ready to continue exploring. With thirteen men around, I didn't expect any difficulty in finding a companion. But I was a little late. The scientists were all busy with their work. The first mate was on watch....someone always had to be on board. The skipper had his ears glued to the radio....besides he wasn't the exploring type. So.....off I went alone to see what I could see without getting lost.

The airstrip seemed to be the best place to start. When I got to the end I could decide what to do next. The airstrip runs from West Lagoon to the outer reef. The runway parallels West Lagoon, Center Lagoon and East Lagoon. I could see the ocean far ahead and West Lagoon in the distance behind. About halfway along the airstrip I had a moment of alarm when thousands of birds took wing. The growth had nearly covered the strip at this point. The birds were not visible until I was upon them. They flew around me making a terrific racket, and followed me to the end of the runway, a few even farther. I did not go out onto the reef alone, but I did stand and look and dream.

Being alone and isolated was not lonely. Thoughts tumbled over one another with great rapidity. I thought of the growth of a coral atoll, the billions of small animals building endlessly to create a piece of ground. A bird with a seed stops to rest and a plant results. A coconut drifts thousands of miles across the ocean onto this protruding piece of earth and a tree grows. Finally an outrigger canoe filled with

adventuresome Polynesians arrives and a community is built. This is carrying the daydream too far with Palmyra; natives never settled here.

Dreamily I edged along the shore. There was a sand beach a few feet wide. I followed this until I was stopped by one of the misshapen gun emplacements. This one was at an odd angle, the seaward corner embedded into the coral a foot or more. The dense jungle had entwined around it. I was able to make my way over the top, but on the other side, the heavy undergrowth had pushed to the water's edge and out onto the reef. Footing was precarious and I did not want to make my way out over the coral flats around this tangled mass. What to do....head back to the settlement? This was much too quick a finish to my solo safari on Palmyra. I knew the lagoon was only a few dozen feet away. I headed toward it breaking branches, climbing over decaying fallen trees. A few tortuous feet and I came across a cleared space. That is, there were no large trees and bushes.....only a mound covered 'with sprouting coconuts unable to take root. I realized that this must be the site of another underground storage. Travel across the cleared space was not easy. With every third step my foot would sink through the accumulated debris to a depth of a foot or two. Another patch of dense jungle and I reached the lagoon. It was beautiful! The water was calm and still, unlike the continual mild turbulence on the ocean side of the atoll. All around the lagoon stretched a thin strip of earth on which tropical foliage grew abundantly. Off to my left lay a small opening. At one time that had been a channel entrance to the lagoon from the sea. Time and tides and encroaching growth had closed the channel. The remains of a small wrecked ship was in the clutches of the jungle. I surveyed the situation to see how I could make my way from this spot on the lagoon, around the lagoon and eventually back to the settlement. The survey didn't take long. It was impossible without wading. As I was considering this an inquisitive black tipped shark made a circle around the shadow cast by my body on the lagoon surface. I gave up the idea and headed back in the direction from which I had come, when I heard a tremendous crashing, breaking cracking sound.

I turned and looked and saw nothing. The growth was thick. A few moments later a machete came into view chapping away at the tangled vines. Friends and companions! It was Jack and Royd and John and George. George was carrying a huge Japanese fishing float that he had just found on the reef. The men were tattered and scratched and dirty but excited.

We decided next to investigate the outward islets. To get there we had to get across the lagoon to the causeway. Now we all faced the problem that I had faced a few moments before. The jungle was impenetrable and the water was shark infested. We huddled together and waded in knee deep water. The lead man and the last man used the machetes to ward off the sharks. They killed two in 'the first fifty yards.

Another decision had to be made. We had to pass a small inlet. The water there was deeper. We could attempt to wade across the narrow channel or cut a path through the jungle again. Not one of us wanted to chance the deeper water where the sharks might be bigger.



**The jungle was impenetrable.**

Back to the interior. The total width of the land between lagoon and sea was only fifteen to twenty feet, but once we were two feet from either the lagoon or the shore it became black and dark, and neither sea nor lagoon was visible. Our two machetes were large and heavy and sharp. After an hour of clearing our way we reached the Cooper Island end of the causeway.

When we were out in the open, the birds again joined us. The sun was hot. We were tired and thirsty. The machetes again came into good use as George cut down several fresh green coconuts and we drank our fill of the thirst quenching coconut water. Refreshed, we headed across the causeway.

The island on the far side of the causeway was a breeding ground for the gannets or, as they are better known, boobies. The next were built only a few feet off the ground in the low leafy trees. We were able to approach to within a few inches of the fluffy white chicks and within a foot of the adolescent birds before they took uneasy flight. The parent birds would watch from a safe distance while we admired and photographed their offspring.

It was getting late. We made a hurried retreat before darkness fell. The return trip was uneventful and much quicker. We had learned to follow the signs of the former jeep road. The road led back to the airstrip which we could follow easily to the settlement.

I took a long fresh water shower and shampooed my hair and got into a clean bathing suit before going back to the ship to make preparations for leaving Palmyra.

Departure was set for early the next morning. I wondered how Samoa, our next scheduled landfall, would seem. Palmyra was lovely that evening. Could any other atoll or island in the South Pacific be so beautiful? Jerry was on watch strumming a Tahitian tune on his guitar. The shore boat eased up to the ladder and I slowly swung myself on deck.

Something was wrong! Jack was quietly setting things out for a dinner on deck. There was no horseplay among the three stooges. The skipper was checking and rechecking lines silently. I looked around and headed below to ask Brad what was wrong. George was coming up the companion way.

“You’d better stay topside, Marge.”

“What’s wrong?”

“One of the seismometers in the three component instrument is misbehaving. In fact, it gave no record at all in the lagoon drop this afternoon.”

And from John “Brad and Forrest and Bob are below and they have everything taken apart. It’s terrible.”

The lagoon drop during the afternoon had been one of the most successful ones of the expedition as far as the drop, release and recovery were concerned. The first two seismometers had given excellent records, the tape from the third showed no activity, at all. What was not functioning? The tension now was much higher than the tension during a drop. The salon was converted into a laboratory. Elaborate electronic diagrams and circuits were spread out on the benches. Each wire, each transistor, each connection had to be examined and checked and tested. Was there one faulty connection or was the seismometer motor contact corroded from repeated use? I crept through the salon to take some things to my cabin. The scientists didn’t even notice my passing. Wires, diagrams and tools were scattered all about. I



silently returned to the deck to eat. Brad grabbed a quick bite, grunted, looked worried, said it didn't look good, and disappeared below again.

Departure from Palmyra was obviously going to be delayed. The future of the expedition was laid out on the gimbaled table in the salon. It is difficult enough to rework equipment on shipboard anchored in a calm lagoon. It would be impossible to do it at sea even under gentle swells and doldrums condition. The night vigil continued. In the early morning hours the faulty connection was discovered in the least likely place. A tight sleeve around a pin contact had slipped a hundredth of an inch due to the constant seismometer motion as the ship heaved up and down. Once the difficulty was located, the correction could be made in a few minutes, but the intricate task of reassembly would take most of the morning.

There was time for one more exploring expedition. Those of us who could not be useful on board left to search for the elusive night prowling coconut crab. These crabs and the rats are the only creatures on the atoll who are not hungry. The crabs are able to break open a coconut with their pincers and eat the meat. The rats grow fat on the leftovers. The crabs grow to enormous size as do the rats. Our supplies for this expedition were our trusty machete and a couple of gunny sacks liberated from one of the supply depots. I went along as cameraman.

We suspected that the crabs spent the daylight hours in dark regions under the decaying floor boards of old buildings. After climbing over a twisted gun emplacement and the remains of a concrete bunker, we found just such a building. We stationed one man inside and one outside. We pried up a floor board....nothing. Another and another.....our batting average was not good. The final board uncovered our prey. He was huge and very fast. Before we could use the machete to toss him out in the open he had scurried under a sagging wall and out the other side. The outside man was on him, but the crab ducked back under the wall immediately. The machete, flat side against the crab, was used as a lever to pry him out in the open. We guided him toward the sandy edge of the lagoon. His body was eight to ten inches in diameter and his claw spread was more than double that. His front pincers actively broke everything they contacted, even rather large dense pieces of tree trunks. Royd was most anxious to get the creature back on the ship for some South Sea crab bisque. With difficulty we got him into the gunny sack and carried him back toward the village. How could we keep him on board? We located a strong steel wire basket at one of the supply depots. It looked like a safe cage for our new found pet. Caged crab and crew returned to the ship.

The seismometer was repaired. We could take off in a couple of hours when the tide was high and the channel could be navigated safely. Meanwhile, there was time for some diving.

The sharks had deterred us from diving in the lagoon. The clear open water of the outer reef seemed safer and more interesting. Stan, Brad and Jack were the eager divers, and of course I hated to be left behind when an interesting safari was in the offing. We took the shore boat and followed the channel to the outer reef. The tops of the coral heads were visible only a few feet below the surface. My excuse for going along was to man the boat and keep in constant contact with the divers. They came back periodically with glowing reports of the beauty, the abundant sea life and no sharks. After about fifteen minutes, I couldn't stand it any longer. On went my face plate, snorkel and fins, and I followed the anchor chain down into the silent world.

We were anchored in about twenty feet of water. I went to the bottom and swam toward a coral head. I had no more than gotten oriented when I ran out of breath and had to return to the surface. After a few quick breaths I was down again and this time I knew where I wanted to go....back to the large coral head off the stern of the boat. It was surrounded by hundreds of brightly colored tropical fish traveling in orderly schools. A large lazy fish seemed to be the choreographer, directing the various troupes in graceful floating patterns. The first group glided into a crevasse between two different types of colored coral; and out from another opening came an iridescent blue group, taking a bow in front of my face plate before turning the stage over to another team. I surfaced and descended repeatedly. It was hard to tear myself away, but soon the skipper said the tide was near flood and we must go back. We had seen hundreds of fish but not one shark! Diving outside the lagoon seemed to be a reasonably safe occupation.

The trip back to the ship was a wet one. It was raining again and the wind blew. The shore boat traveled at full speed. I redonned my face plate and snorkel and found visibility and breathing much easier.

What does the future hold for Palmyra? Will she always be a rarely visited, scientifically interesting, romantically beautiful, deserted Ghost Island? Commercial copra production has been tried without success. Several developments have been proposed by lessees in the past: the ROYAL POLYNESIAN CLUB planned to develop the entire island as a private prestige resort; POLYNESIAN PARADISE promised a combination of talent, intimately acquainted with the environment of the Pacific Island living, culture, business, tourism and construction, teamed together to plan and program a new resort development on Palmyra; the COCONUT PROCESSING COMPANY attempted to build Palmyra into a big laboratory for marine biology, oceanography and any other sciences that needed a hot outpost close to the Equator. So far, none of the great plans for Palmyra have come to fruition. It is unlikely that the atoll can be developed into a profitable resort retreat. It would

take five hundred men at least six months to clear the jungle of derelict buildings and installations. The cost of labor, materials and construction would be prohibitive. But Palmyra will always be scientifically interesting and beautiful to all people who stop at this tiny dot of land in the middle of the Pacific.

We had found Palmyra an exciting and memorable experience. We had enjoyed our days and nights, but the time had come to leave. Interludes are pleasant, but I suddenly realized that the ship had become more than just a platform for scientific measurements. It was our universe, our security, our home.

I took a good look at the DWYN WEN. She had been at sea for seven weeks. There was never enough time to keep up with the sanding, painting and varnishing that any ship needs to keep in top condition. The paint was a bit weatherworn and dirty. The rust lines had formed uneven streaks on her white hull. She was a well-traveled, well-used, tired old ship. The skipper commented "At least we have a right smart looking crew, gives you a feeling of confidence." The three stooges were on deck.....two months without a haircut or shave, white rags tied around their heads to keep the hair out of their eyes, dirty ragged Bermudas. John and George were exchanging rough jokes near the mainmast. Big Jim sat a few feet away. He looked almost menacing until I realized that he was scowling in concentration over a book by Leon Uris.

A final check was made to see that everything was ship shape. The crab cage was well secured. The spheres and anchor plates were doubly lashed. Seismometers and electronic gear were wedged together in their foam rubber padding. Water barrels were full. Dinner was in the oven.

"Hoist anchor!"

We were off. The trip out the channel was easy. We had had the experience of coming in and also had covered the channel on our diving expedition. Half way out we tested some "May Day" flares that had been given to me just before leaving La Jolla. It was late afternoon. We knew that there were no ships or planes within more than a hundred miles. These flares were only visible about four miles in daylight, so we decided that it would be safe to test them. The first was a dud; the second went off after the third try; the next went off immediately and behaved as the brochure said it would. I am glad that we didn't ever need to rely on them!

We were out of the lagoon, through the channel, past the outer islets and into the open sea. We looked back at an isolated Pacific atoll as it disappeared on the horizon and we sailed south of the setting sun.



**At least we have a right smart looking crew.**

## CHAPTER IV ANOTHER MISERABLE DAY IN PARADISE

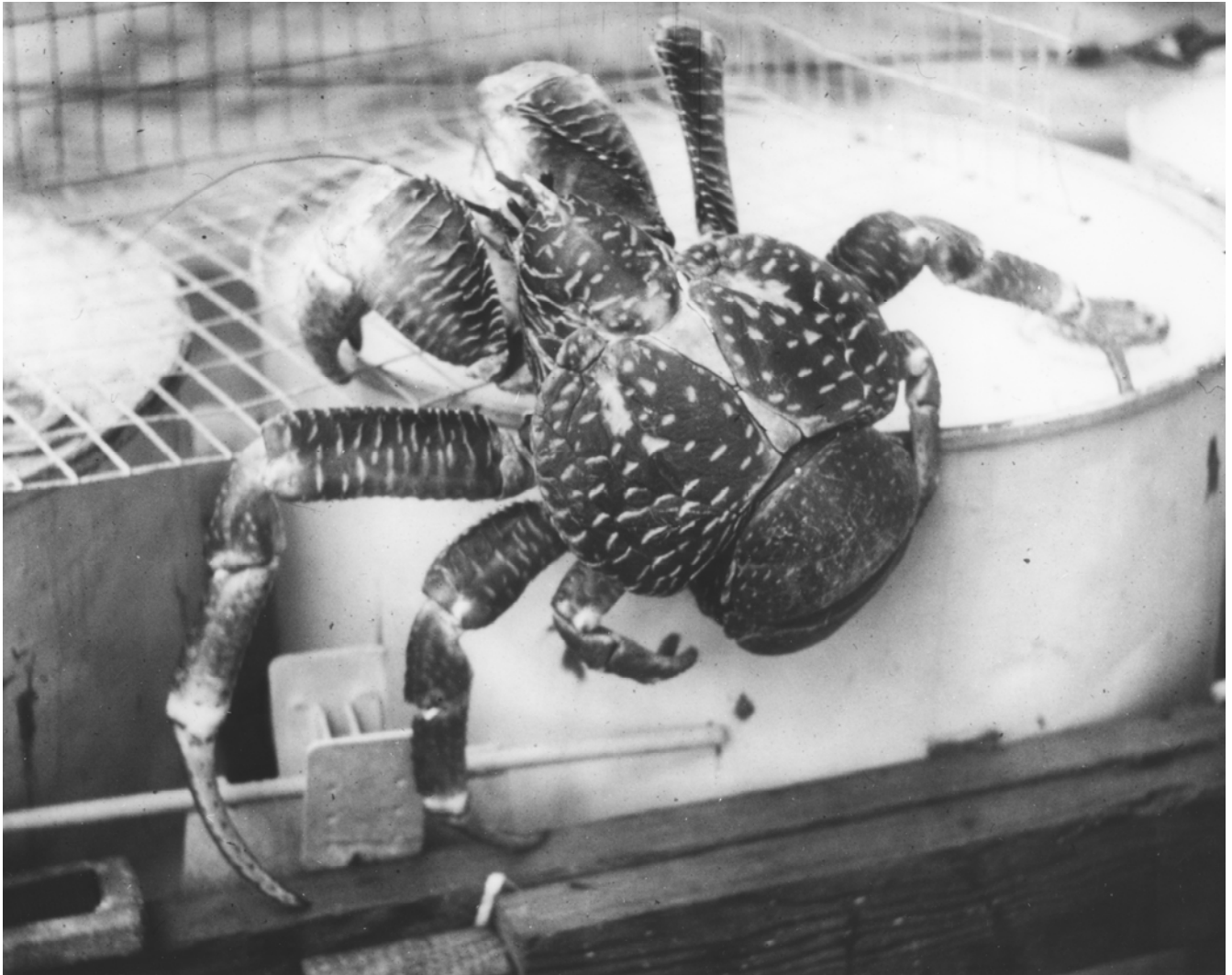
The Ghost had left its scars on the DWYN WEN family. We were all liberally covered with infected insect bites, festering scratches, and painful bruises. The continual rain and high humidity on Palmyra were not conducive to the healing of our wounds. Even bandaids and bandages had become soggy and wet and would not stick. Back on board ship the medical kit came out; cuts were cleansed and bandaged; wounds had a chance to dry up and heal. Arms and legs chapped from the rubbing of damp clothing quickly came back to normal. It was good to be home again, back to a dry environment, back to my own bunk, back to the routines of daily living.

We were in the doldrums....little wind.....calm sea. The fisherman was up to catch what little breeze there was and to stabilize the ship. It was a lazy time. The scientists slept, trying to make up for the sleep lost on Palmyra. I learned more about sailing and navigating. No longer did the watch stand over my shoulder to make sure that I was on course. We would sit and talk. I learned of Tahiti, Moorea, Bora Bora, and the Marquesas. I heard stories about the Polynesian people. I learned why the young men of our crew left school and jobs to make a life for themselves on the sea. The peace of mind and contentment at sea is not to be found any place else. We discussed religion, philosophy, mores, politics and world government. Our crew was unanimous on one item....."keep the French in Tahiti!"

One morning I was awakened early by the watch....."Come up on deck, Marge, and bring your camera." I went up. The brilliant fore-image of the sun radiated red spokes of color fading to a pale pink at the outer limits of the pre-dawn sky, broken only by cloud patterns. It was more beautiful than any sunset I had ever seen. From that morning on, I was always up before sunrise. Often in the early morning I would take the helm while the watch went below for coffee or opened a fresh coconut for us.

Unusual squalls and choppy seas sometimes occur in the doldrums. After one such night I was loudly cautioned by the watch when I came on deck....."Watch out, Marge, the coconut crab is loose!" I thought he was joking until I took a look at the cage. One side was completely torn apart and the crab had escaped. The rough weather had upset our pet. We were pretty careful about where we stepped, where we put our hands, where we stopped or leaned or sat. This crab was strong enough to break a coke bottle with his pincers. Without any effort he would be able to take off a finger or toe, or completely mangle a hand or foot. We made a thorough search but could not find him. Perhaps he had gone overboard and tried to get back to Palmyra.

However, we kept looking, and two days later we found him wedged behind the barrels of diesel fuel. With great difficulty the three stooges got him out and put him immediately into the stew pot.



**We found the coconut crab wedged behind the barrels of diesel fuel.**

During the time that the crab was loose on deck, we noticed that there were no more signs of the rat. Had the crab killed the rat? If so, the remains should become evident before too long. Or, had the rat come into contact with the crab and decided to go overboard? We never knew.

With each passing day on shipboard in the doldrums, I became lazier and lazier. Breakfast, a nap or reading, then launch, another nap, a turn at the wheel, adding a few paragraphs to the continuous letter to Bari, a bucket bath, dinner, washing up, another turn at the wheel before going below for a game of Monopoly or Clue with members of the crew. An exciting game would often last until well after midnight with the change of watch changing hands in the game.

The nights were warm and calm. Sleeping on deck became the usual practice. I would take an air mattress for comfort and a lava lava as a cover. I slept between the seismic spheres and the diesel fuel barrels. It was quiet, comfortable, and reasonably private. An approaching squall was announced by the watch; I grabbed my possessions and headed below until it was over.

We were approaching the Equator. The southern stars were visible. Night after night I would ignore the compass and steer directly toward the Southern Cross. These quiet evenings at the helm gave me a chance to reassess my activities on shore.....to think of my philosophy of life.....to ponder where we are going and why. The activities at home of community service committees, faculty wives' affairs, entertaining visitors, cleaning, scrubbing, washing and ironing.....seemed quite unreal, unnecessary and futile. There is little time in the hectic pace of modern living to get acquainted with oneself. Personality becomes submerged under the innumerable activities of a given moment. At sea life is very simple. There is time to think and dream uninterruptedly. The only moment of importance is the present. The mistakes, tragedies and triumphs of yesterday are gone, never to be recaptured. Tomorrow is some vague thing in the future. Today's conditions determine today's activities. Tomorrow's plans depend on the unknown factors of sea and wind. The Skipper once said that I would never be the same again after sailing on the DWYN WEN. The sea and the ship taught me to live each given moment to its fullest.....pleasures and accomplishments are measured on a continual rising graph. By living each moment to the fullest, the graph will never reach a plateau.

We were in the midst of the hot, lazy, windless, enervating doldrums. The one hoisted sail tried unsuccessfully to find a breeze. The diesel engine chugged our way toward the Equator. My rapport with the crew seemed to diminish. When I approached a group, they would stop talking, glance at me with a strange glint in their eyes, then look at each other and start laughing. I was not alone in this ostracism. Others noted the same withdrawal. It didn't take long for the truth to dawn. Some of our crew were Shellbacks, veterans who had crossed the Equator before, an elite group. They had already been accepted by King Neptune, and King Neptune reigned supreme in this part of the sea. The three stooges and the four of us aft were the only Polywogs on board.

Royd, my closest companion among the Shellbacks, obligingly suggested that I might want to finish off my various letters to deposit in the mail buoy anchored at the Equator. The mail boat came along once a week to collect the contents. I pulled out the typewriter and typed feverishly for a couple of hours until the hilarity of the Shellbacks on deck made me realize that I was truly a gullible Polywog!

The great day arrived. Stan plotted our location and took frequent sextant readings. By mid-morning the Shellbacks had closed all doors, the hatch and the skylight to the salon and herded the Polywogs below. With no ventilation, the salon became a hot and sticky hell hole. Our ordeal had begun. We started singing ‘The Birmingham Jail,’ ‘We shall Overcome,’ ‘Mine Eyes have seen the Glory of the Coming of the Lord,’ etc. The salon resonated with Big Jim’s bass, Brad’s tenor and Polywog harmony. The skylight was opened a crack. Down came a microphone. The whole court session was being taped. When the stuffiness below was on the verge of becoming really oppressive, the door opened.....

“King Neptune calls Marge Bradner as the first witness.”



**I was helped to a sitting position on deck.**

I was hauled out of the hold unceremoniously, blindfolded and pushed to the deck. The first breath of fresh air revived me. As I stepped out of the charthouse door, I received a full bucket of salt water in the face, followed immediately by a



liberal sprinkling of flour! Needless to say, my mouth was open. Since I was a woman, I was not tied. I was able to use my hands and feet for balance. However, maneuvering blindfolded on a rolling ship was not easy. I was helped to a sitting position on deck, but just where, I hadn't the remotest idea. One by one the other Polywogs were led on deck. We each were asked if we had any last request....mine was "Please take care of Bari."

Brad answered in a solemn voice, "We who are about to die," then with emotion, shouted "detest you!"

"Come on, girl - sit down, woman!"

"Oh Lord, save me."

"It was a good fight Mom, but I lost." Then Bob continued in vulgar Spanish.

"Better days are coming."

"How come he ain't tied up?"

"Fix that blindfold!"

"Jenkins needs cooling off - cool him off!"

"King Neptune's Court is now in session. First defendent, Marjorie H. Bradner."

"It has been noted that.....in spite of years of careful planning and teaching by your associates, the American women, in the arts of deceit, laziness, women's intuition and throwing of tantrums.....that on the ship DWYN WEN you have abandoned all these arts. In a field where there are eleven men and one woman, it is unforgivable that these goals have been abandoned. It has been noted that you have tried to talk to bachelors about not changing their standards or raising their immorality. This type of action cannot be tolerated and deserves the severest punishment. Do you plead guilty or not guilty?"

"Not guilty!"

"She lies!"

"Punishment - the Stretching rack."

More water. I felt that the sea was coming down upon me. The quick absorbing flour turned the wetness into a sticky mass over most of my body. I was guided across the deck and tied to the rigging, ordered to hang on to a slippery nylon line above my head: then the line was cut just below my strongly gripping fists. The blindfold was removed.

The sight I beheld was unbelievable! King Neptune's beard was made from several dismantled shiny copper chore boys; his robes, of artfully draped bed sheets; my sailor's hat on his head; and the Yagi directional finder held as a scepter. The executioner, clothed in a long red flannel gown, wielded a machete. The first mate

stood at the helm, since some of the necessary functions of a ship had to be observed. Jack had the tape recorder and two cameras.

All around me on deck, tied hand and foot in awkward positions, were the other Polywogs, covered with a rapidly drying film of flour and salt water paste. To the rough treatment from the Shellbacks, they responded profanely. The deck looked like the remains of a hurricane in a bakery.

The line started to slip through my grasping fingers. I looked up and saw that the other end was tied to a precariously balanced bucket. What was in the bucket? Garbage, fish, more water, paint? Crushed ice and water cascaded down on my head and streaked the paste so that it ran into my eyes and made a soggy mess of my hair.

Brad had committed the most serious crimes against King Neptune. “King Neptune’s Court accuses you of spying on his domain by direct invasion of his boundaries by sinking robots into the water to get secret data. We want to establish your authority in his domain in the matter with the following questions not pertaining to Clause 14, sub section 12, revision 147, or data periods prior to aquatic times established by the U.S. Air Force.” An incomprehensible, highly technical quote from a scientific journal followed.

“What is your opinion? Could this be possible?”

“May it please the Court, am I being charged with .....

“Contempt! Prepare for the execution. You have been found guilty.”

Blindfolded, on hands and knees, Brad had to guide a large yellow onion, called a sphere, with his nose across the now sticky, gooey deck of the DWYN WEN.

By the time he was through, he was a mess. The blindfold came off and the only part of his body not covered with a thick layer of paste was his eyes.



**Brad had to guide a large yellow onion, called a sphere, with his nose across the now sticky, gooey deck of the DWYN WEN.**

Bob was accused of strumming the guitar and impersonating a Mexican when in reality, “you are nothing but a capitalistic gringo!;” of trying to start a new breed of astronaut by trying to hatch a goony bird egg on lava rock; of attempting to dethrone Dirty Dave as the greatest drinker on board and attempting to addict the entire crew of the DWYN WEN to the use of alcohol; and of singing obscene Tahitian songs.

The three stooges got the worst of it. They were terrified that their hair would be cut or that they would be shaved. During the entire time the charges were being read, a Shellback brandished electric clippers near their ears.

Big Jim’s crimes were too numerous to mention. He had arrogantly offended King Neptune by telling imaginary south Sea Tales of past voyages, when in reality the extent of his adventures were experiences on the ‘Jungle Trip’ and ‘Submarine Ride’ at Disneyland. Most serious of all, he had tried to grow a beard as fine as Neptune’s own.

“Don’t shave it off!”

“Give me the scissors.”

“Sit down, be a sport.”

“That’s enough.”

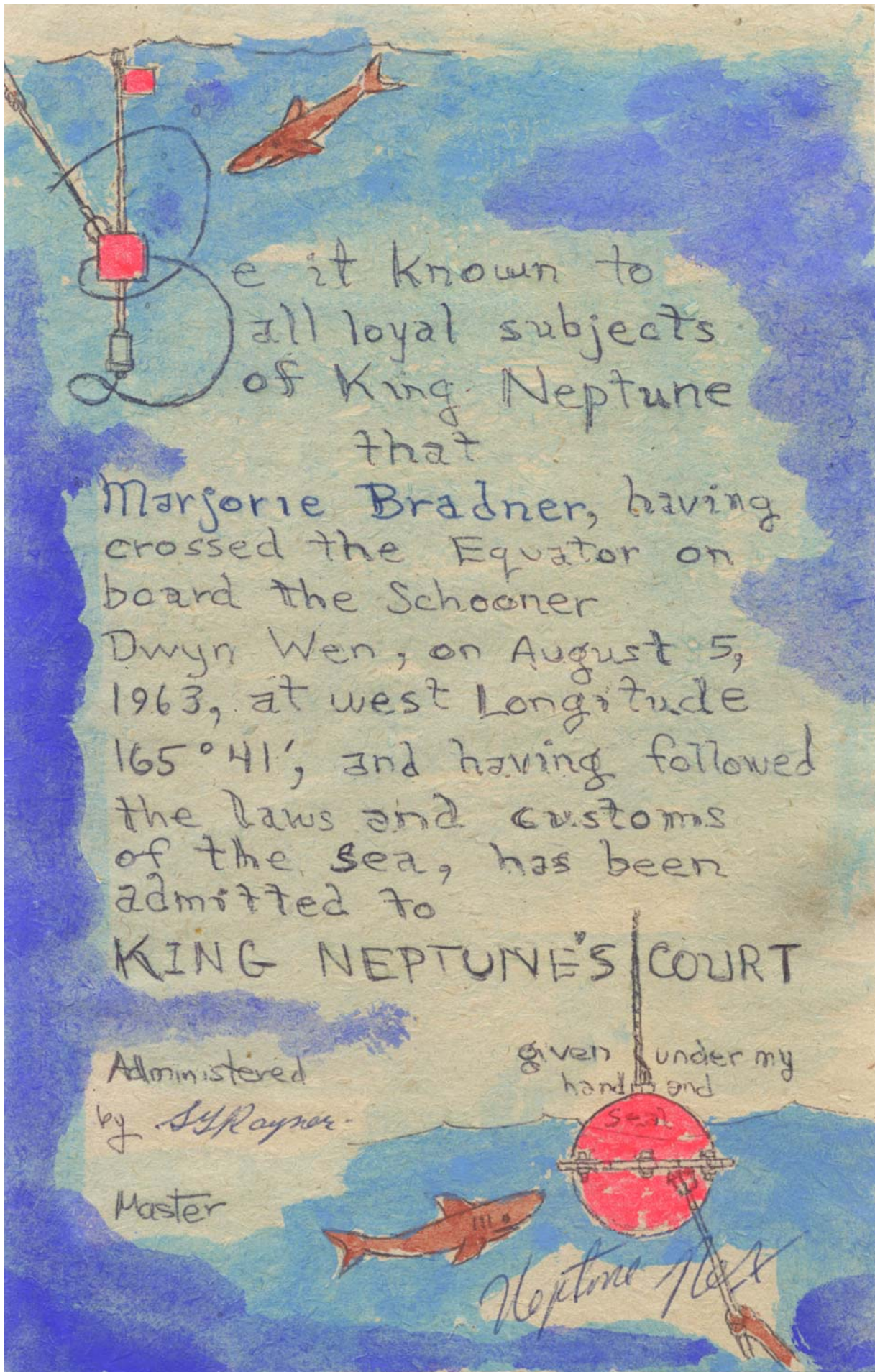
George, even though known to be of good character and temperate habits, had been observed by the DWYN WEN Shore Patrol approaching a bar stool, expanding his stomach, swearing at the bar maid and degrading his master’s name by getting drunk, becoming belligerent and passing out on one over-proof rum drink. He was accused of starting various fads on shipboard while still a mere Polywog, thus offending all true Shellbacks.

George threw everyone off when he pleaded “guilty.” However, he did not escape punishment. He clung tightly to the bos’n chair when the belabored groans of the Shellbacks and the creaking of winches supposedly hoisted him to the top of the mast. In reality he was never more than two feet above deck.

John was accused of disturbing King Neptune by playing Rock and Roll music and by jumping into the water on sphere pick-up; of developing a procedure for pumping fuel from barrels with the maximum amount of hollering, pump leaking, deck staining and confusion. His most serious ‘crime’ was that of promoting nudism and obscene literature on board. Blindfolded, he was forced to walk the plank which, unknown to him, had been rigged amidships.

We were now almost but not quite a part of the sea. The final part of the initiation tested our artistic abilities. Three pans filled with yellow, orange and purple poster paint were brought on deck. We formed a circle, each person exhibiting his talent on the back of the person to his right. The supplies ran out. A bottle of catsup and a jar of mustard found their way to the studio. We were covered, the deck was covered, even the Shellbacks did not escape.

Out came the brushes and brooms and hoses. For the next hour, between turns of cleaning up the deck and lathering ourselves thoroughly with salt water soap, we dove or were tossed into the sea. The water was warm and salty....in, out, swabbing the deck, more soap, in again. We kept repeating the process until ship and personnel were once again presentable.



Be it known to  
all loyal subjects  
of King Neptune  
that

Marjorie Bradner, having  
crossed the Equator on  
board the Schooner  
Dwyn Wen, on August 5,  
1963, at west Longitude  
165° 41', and having followed  
the laws and customs  
of the sea, has been  
admitted to

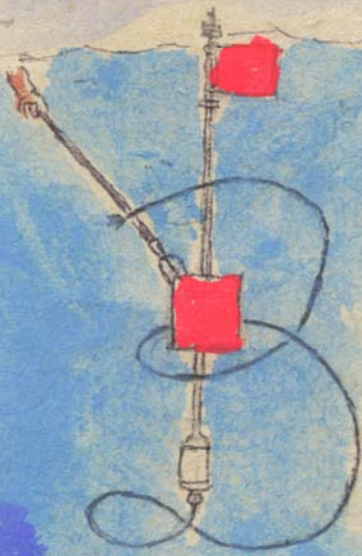
**KING NEPTUNE'S COURT**

Administered  
by *Sy Rayner*  
Master

Given under my  
hand and



*Neptune 1963*



Be it known to  
all loyal subjects  
of King Neptune  
that

Dr. Hugh Bradner, having  
crossed the Equator on  
board the Schooner Dwyn  
Wen, on August 5, 1963,  
at west Longitude  $165^{\circ}41'$ ,  
and having followed  
the laws and customs  
of the Sea, has been  
admitted to

**KING NEPTUNE'S COURT**

Given under my  
hand and

Administered  
by *A. Kayner*  
Master



*Neptune Rex*



Dinner was special: fried chicken with a wonderful French sauce, heart of palm with olive oil and vinegar and fresh coconut milk. The coconuts were put in the center of the table with the appropriate utensils. When you were ready for your drink you whacked away at the coconut with the machete or opened the eyes with the screw driver. We were a relaxed group. A wildly wielded machete across the dinner table did not cause any of us alarm.

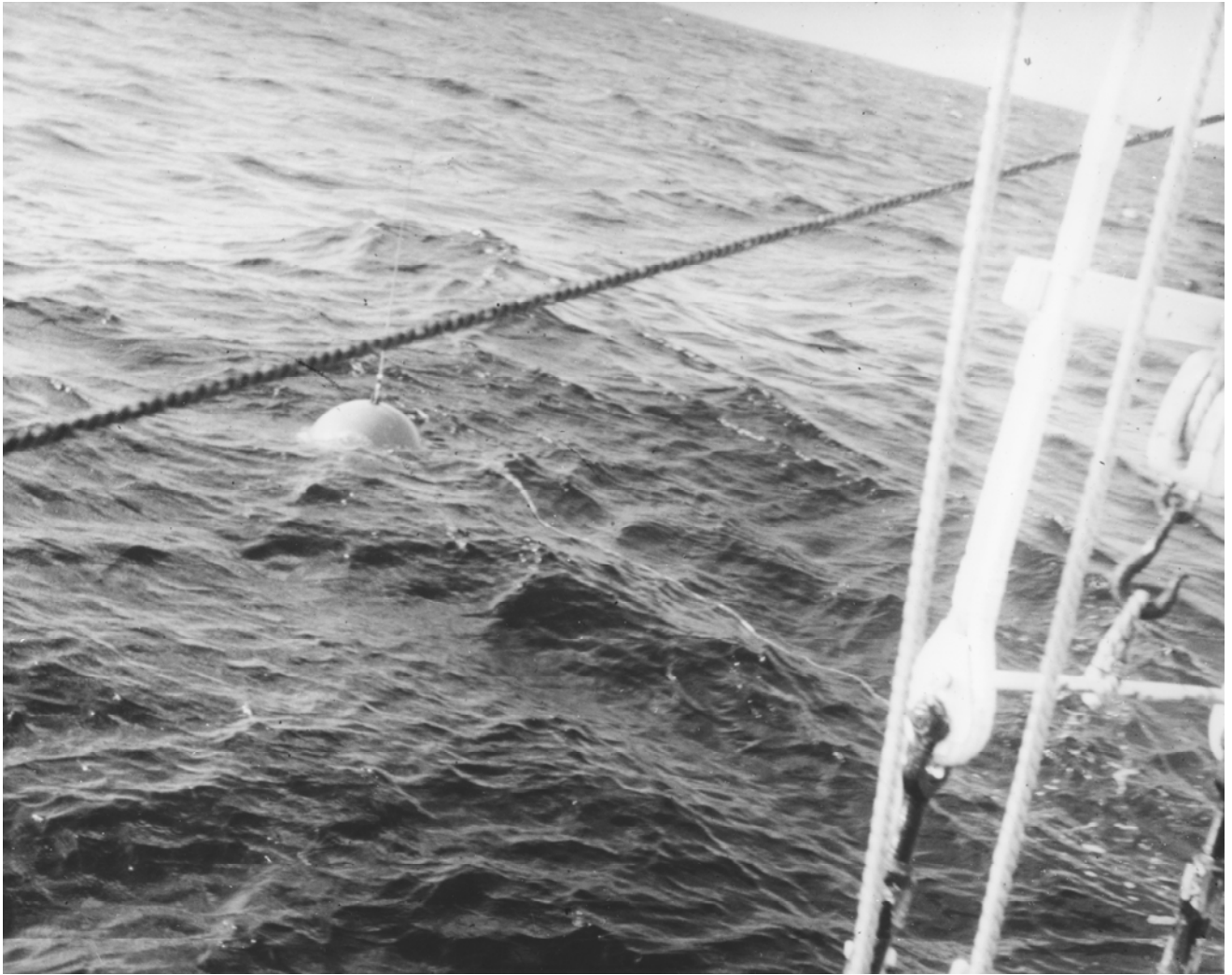
Daily life was routine, but each day brought some new experience. Brad and the Skipper were the only two on board who shaved regularly. Brad was balding and didn't need a haircut, the Skipper was beginning to look a bit shaggy. He said he'd heard that I cut hair, would I cut his? I told the Skipper that if he was willing to take the chance, I would attempt the job. When I had made a good start over his left temple, he remembered Jim's warning: "Whatever you do, don't let Marge cut your hair!" I had cut Jim's hair a year before and it had taken three months to grow out enough for a professional barber to put back in shape. However, the Skipper relaxed and I began to enjoy the challenge. Combs and brushes, rusty clippers, imagination and artistic styling were my tools. I was well underway when I began getting advice from everyone on board. "Take a little more off here"....."What in blazes did you do there!" ..... "Here, let me have the clippers a minute!" Then Big Jim let it be known that he had cut hair when he was in the Marines. I lost my job, but after seeing the end result, I became convinced that I was the best barber on board. Stan had about a month for it to grow out before reaching New Zealand. I wished him luck.

We were getting into the area of islands. Each day the charts showed that land lay off to the west or south, but we carefully watched the bottom charts. We were a deep ocean expedition. We passed within thirty miles of the Tokelaus, but didn't see them. A few land birds and the ever present cloud formations told us that these lush and beautiful tropical isles of romantic novel and motion picture were just over the horizon.

We said goodbye to the Tokelaus that we had never seen and prepared for the first double drop of the expedition. This was to be a rapid operation because the two spheres had to be dropped close together both in distance and time. Brad decided to drop without the anchored buoy, because our recovery record had been perfect and the use of the buoy was a time consuming process. We needed a couple of hours to set the buoy, run out the three mile line and anchor it to the sea floor. The three component instrument went out first. The one component instrument was ready to be picked up by the staysl boom and heaved overboard a few seconds later. I had

advanced in the drop procedure from being a bystander to becoming a key member of the team. I relieved the Skipper at the helm the minute the second sphere sank glubbing, and he grabbed the sextant to take a sun sight. Even with calm seas and clear weather the wait for the instruments' return seemed endless. This time we felt a double tension because 66% of our equipment was at the bottom of the sea. The deck seemed large and empty when two of the spheres were overboard. There was plenty of room for everyone to stretch out and sleep for a few hours, but sleep is difficult. I kept myself busy winding tape in the electronics cabin, hoping that the recorders would return to use it. I rearranged things in my cabin, unconsciously set out things for lunch, ate without tasting the food, tried to tell a joke but it fell flat. The wind grew stronger, and the waves slapped the hull with an ominous sound. The strain was showing on the scientists. The instrument spheres could not be counted on to continue working indefinitely. At what point would corrosion or repeated jolting make them unreliable or unworkable? The Skipper cruised in a tight circle around the drop point. The time drew near. The radio was activated. Everyone stood by on deck. The wind blew foam off the whitecaps, and dark waves loomed as high as the rail. The radio came to life! At least one sphere had surfaced.





**Sphere off the DWYN WEN.**

The scanning started. Stationed on the staysl boom, I saw something. Maybe a fish, or a bird, or a piece of floating wood, or a Japanese glass ball. I was afraid to open my mouth. Then I saw it again. Orange!

“I see it! There it is!” I shouted and pointed. All eyes followed my finger. No sphere. Was it a mirage? I was sure I had seen it. The radio beacon faded as the ship turned. Minutes later, we rode the crest of a wave and John, from the top rigging, saw the sphere, a quarter of a mile away. Then he sighted the second one about fifty feet from the first. The Skipper brought the ship around, followed the beacon carefully, then swung the ship upwind, and came to a dead stop twenty feet from a sphere. We snagged it by the tag line, and almost floated it on board on a large wave. A quick 360° turn and we picked up the second. A huge sigh of relief went up when our instruments were once again back on board.

As soon as the weather calmed, the spheres were lowered below for the technical check out. The three component instrument gave its reliable readings. Again, preliminary indications were that the ocean bottom is a microseismically

noisy place. The one component instrument gave no record. The difficulty was located immediately. It was the same slippage of the sleeve around a pin contact that had been at fault on one of the seismometers at Palmyra. The single component instrument was not to be used again until after Samoa, so the sphere was resealed to await for repairs in Pago Pago harbor, only about two days away.

Bard said that we must make at least one good double drop to prove the validity of our data. We could tell that individual records looked reasonable, by playing them back on the shipboard oscilloscope. We could do detailed analyses back at the laboratory. But there would be no absolute proof of the data, until two instruments gave simultaneous twin records.

That night at dinner I was presented with a large orange coconut, with a broken antenna in the top, placed on a sea of flue cellophane. The letters U.S.A.F. were painted on one side, an unprintable Tahitian word on the other. The crew refused to tell me what it meant, so I didn't blush until after I arrived in Tahiti two months later.

Our final drop before Samoa took place in sight of a little known privately owned island, Swains. This time we could use land sights as well as sun sights for determining our location, but it was disheartening to cruise so close to another lush tropical island knowing that we would not stop. Our charts showed there was no harbor; the atoll completely enclosed the lagoon. As we watched the island during the afternoon tension period, we thought of the people living there. How many were there? What did they do? How did they communicate with the outside world? Through our binoculars all we could make out was a prosperous looking stand of coconut palms.

While the sphere was below Brad studied charts of Swains and the surrounding ocean bottom. It was a one mile diameter coral atoll rising precipitously from the ocean floor. Three miles off-shore the water is over 15,000 ft. deep. Brad went into conference with the Skipper. Each time I looked their way the Skipper's eyes were sparkling a little brighter; Brad's brows were furrowed a little deeper in thought. Stan liked Polynesians and new islands; Brad liked a land mass in close proximity to deep water. We did not know if there was a radio on the island, besides our radio was still out of commission. It seemed inhuman to pass this lonely spot without at least stopping to find out if everything was well ashore.

We got the word! Swains was ideal for a simultaneous land and sea measurement: deep ocean within a few miles of a stable land mass. The Skipper could get the ship close enough to lay to for the night. Scanning for the sphere was particularly active that afternoon. As soon as it was brought on board and lowered into the salon, the ship turned and headed straight for the island.

The scientists worked hurriedly to get the tapes removed, check the seismometers, prepare the instruments for the next drop. The land station was checked and brought into shape for active measurements. But... two major uncertainties remained: would we be permitted to land? Would we be permitted to make scientific measurements?

We stayed well outside the waves that broke over the outer edge of the encircling reef, as we sailed around the lee end of the island. A wrecked ship loomed in the center of our field of view. We were looking for a flag pole described in the Pacific Island Manual. This would mark our course. In the far distance we spotted a fisherman in a canoe.

“Change course starboard ten degrees.” George had seen the flag pole from the top of the mast. Soon we all could see the flag pole ‘and two long huts at the edge of the beach. Stan let go with two long blasts of the ship’s horn, and immediately the beach came alive with running children and dogs.

We lowered the skiff and Brad and Stan rowed off toward the mysterious island to “see if the natives were friendly.”

People came out on the reef to meet our landing party. Brad and Stan got out in knee-deep water and shook hands all around before they were escorted toward the village. The children surrounded the skiff, picked it up, carried it the rest of the way across the reef and deposited it’ on the beach well above high water line.

For a while we turned our attention to the fishermen who were paddling their outrigger canoes around the DWYN WEN. It began to get dark and presently the Polynesians waved goodbye and returned to their island. We saw no signs of activity on shore. Where were Stan and Brad? They had been gone for more than two hours.

While we waited I reread the Manual: “Swains Island was at one time regarded as part of the Union or Tokelau Islands, which were included in the Gilbert and Ellice Islands Colony (British). This group, at the beginning of 1926, was transferred to New Zealand, to be included in the Western Samoa administration; and about the same time Swains Island was formally taken over by the U.S.A., and included in the Eastern Samoa administration. Mr. Eli Jennings, an American, settled on this island, with his wife, the daughter of a Samoan chief, about 1870. The island lies due north of Tutuila, and is three miles long by one board. It is a place of rich vegetation and gives a big yield of coconuts. There was in 1937 a contented, well-governed community of 125. The island was discovered by Quiros on March 2, 1606, and by him named La Peregrina. Espinosa called it Isla de Gente Hermosa, because of the beauty of its inhabitants. It is eight miles in circumference and fifteen to twenty-five feet above sea level, and it encloses a fresh-water lagoon.”

We waited. The sun set. Dinner was ready. We saw a single figure pull the skiff down the beach and onto the reef and row toward the ship. It was Stan. He called out, "They've got the Doc in a pot!" and immediately broke into a broad grin.

He had returned to the ship to pick up our strobe light to place on the beach for night navigation. There was a radio transmitter on the island and Brad was in communication with Samoa but had not yet been able to reach the Governor. The radio operator, the government representative and the minister all spoke a few words of English. Stan came on board only long enough to pick up the light and return to shore. He had accepted a dinner invitation.

We ate and waited some more. It was frustrating to see an island, a beautiful island, only a few hundred yards away and not be able to land. We saw an occasional light being carried from one house to the next. Now and then a dog barked. The only other sounds were the constant breaking of the waves against the reef and against our hull. It was a dark night but the Southern Cross hung high over Swains Island.

I listened to Jerry, on watch, strumming quiet tunes on his guitar. When he stopped to adjust some of the lines, I heard the sound of oars. I strained my eyes and saw the skiff approaching with four men: Brad, Stan and two Polynesians, one of whom we had seen in a canoe that afternoon. An outrigger came from the opposite direction and pulled alongside. We helped our guests on board, shook hands and passed around cigarettes. We took everyone below for hot coffee, canned fruit cocktail and cookies.

Brad pulled out the Land camera and started taking pictures. At first the flash startled the Polynesians but they soon got into the spirit. The old man of the afternoon, in his kaiki lava lava and pith helmet, insisted that I pose with him. This photograph is one of my prized souvenirs of the South Pacific.



**The old man of the afternoon insisted that I pose with him for photograph.**

We learned several things about the island. There were 105 people living in 15 houses; everyone worked with copra. Once every six to eight months a steamer called to pick up the dried copra. A medical ship from Western Samoa stopped to replenish medical supplies every year or two. None of the men had ever known of a private yacht stopping at Swains before.

The spokesman for this group was Pita. He had been born on the island and as a youth had left to continue his secondary education in Pago Pago. He returned to the island as government representative, school teacher, and medical nurse. He was the only person who had ever returned to the island to live after completing his education. Pita was unable to act as interpreter for long, as the bobbing of the ship affected him and he made a rapid exit for the topside rail. My friend of the photograph soon followed.

The two remaining Polynesians seemed to have somewhat steadier stomachs. One spied Jerry's guitar in the corner, and by involved sign language, implied that he played. Someone produced a ukulele from the forecandle and a long evening of music got under way.

The evening passed rapidly. Even with help, our guests had difficulty maneuvering from the deck of the schooner to the canoe a few feet below. These descendents of the famous migratory sailors of the Pacific were not at home on our craft. However, once in their own environment, they recovered quickly. We could hear them singing and chatting and laughing all the way back to the island.

At last we got details of what had happened on shore. The radio connection to the acting Governor of American Samoa had been completed after many delays. Permission had been granted for the land station measurement and for shore leave for the crew after the completion of the ocean drop. Brad and Stan had enjoyed their shore leave and a delicious dinner of raw fish and coconut cream at Pita's house.

We made our plans for the following day. Brad would take the land station to shore and set it up with the help of Jack and Royd. The ship would put out to sea for the ocean drop. I was to go to shore with the landing party.

## **CHAPTER V**

### **POLYNESIAN PERFECTION or NEVER ON SUNDAY**

With Brad at the oars, we inched our way over the gentle swells toward the reef under the pre-dawn sky. The ship, our haven on the water, headed for the open sea at full speed the moment we boarded the skiff. The crew had called out instructions, "Pray for our souls in church." For a moment all thoughts of adventure left me as I watched the DWYN WEN disappear. The ship was our security.....as a blanket is to a small child, as home is to the traveler.....and she was leaving us.

We looked toward the outline of the strange land ahead. We saw only our flashing strobe on the beach. There were no people, no dogs, no signs of habitation. A narrow channel, no more than two or three feet side, had been dug from the outer reef half-way to shore. When the miniature channel ended, we climbed out of the skiff into the dark water. I held the boat in position while the men bore the scientific gear over the rough portage to the beach. They returned and we carried the skiff to a safe anchorage.

The early morning silence was broken only by the gentle convolutions of the reef waters and the incessant trade wind rustling the fronds in innumerable palms bordering the deserted beach. Two large palm-thatched boat houses, each sheltering a twenty-man outrigger canoe, stood in a nearby grove. A large beautifully primitive, open-sided building with a thatched roof supported by tall palm trunks blended into the surrounding groves. This turned out to be the village meeting place and center of community activity. Our guide post, the flag pole, loomed alongside. No other indications of civilization could be seen.

Brad ventured into the village to contact Pita and get help for setting up the land station. It was too early. There was not a sign of life. Even the chickens and dogs were sleeping. The overlapping woven mat curtains of the huts were lowered. Brad returned and drafted Jack and Royd to go with him to locate a quiet spot in a coconut grove for burying and installing the land station. I was to stay by the equipment until they came back. I watched until they disappeared along the beach. The horizon was flat and uninterrupted. The DWYN WEN had long since vanished from sight.

I huddled on top of the equipment. The eerie feelings of early morning faded as the sun rose. The grey waters of the reef turned sparkling, clear. I breathed the beauty, quiet and peace of this lovely place for a long time, until a slight movement a few hundred yards down the beach, in the opposite direction from the one taken by the men, attracted my attention. I turned and watched. In a few moments, the movement repeated itself, and I could distinguish several children at the edge of the

forest watching me attentively. I did not move from my post nor make any gestures. Two youngsters moved down onto the beach and approached closer for better observation. When they were about ten feet away I smiled and said 'hello.' Their immediate responsive smiles and gestures told me that this is what they had been waiting for. They kept their distance, but we were able to communicate a little. Tani who knew a few of English was about ten, Aloha a few years younger. They attended school on the island. I learned that their father was Oehr and their mother Malika and that there were six children in the family. Tani was the oldest. I gave them some candy from the voluminous pockets of my A-frame muu muu. They smiled and took it and said, 'Fatai.'

A sudden violent rustling in the trees announced the first rain of the day. Tani said excitedly "Come, my house," and motioned for me to follow. She led me up under the boat shed and rushed back down to the beach to gather up the equipment and place it under the protection of the overhanging thatch. I tried to convince her that the cases and coverings were water-proof and that it was much too heavy to carry, but she failed to comprehend. So I joined her in transferring the bulky bags. We had just started when Jack and Royd returned and helped us with the more cumbersome items.

The men had located an excellent spot for the land station in the center of a protective stand of palms. Brad had gone off to the village to learn if this location met with the approval of the elders. Jack and Royd had returned to be ready to tote the equipment to the experimental site. We waited out the storm which didn't last long. Jack and Royd were experienced in conversing with Polynesians by means of pantomime interspersed with an occasional English or Tahitian word....their experience came from previous trips to the Marquesas and Tahiti. We learned that this was a 'modern copra plantation.' It had a copra drying shed and wooden tracks for transporting the loaded copra bags to the beach. Brad had still not returned so, led by Tani, we walked along the hundred foot wooden railway toward the shed. The car filled with copra coasts by gravity down to the beach for loading on small boats for transport to the steamer; the elevation of the island is only about twenty feet, so pushing the empty car back to the shed does not entail heavy labor. The pungent smell of drying coconut was always with us.

The village itself consisted of about twenty Tokelau-style rectangular fales surrounding a grassy malae. Their harmonious architecture contrasted with two New England style buildings: the barn-like copra shed and a square white Congregational Church. The village water supply came from the gutters around the roof of the shed and was stored in two large tanks.



Tani again repeated her earlier invitation, “Come, my house.” We followed her across the grass where Oehr waited at the entrance to greet us. We smiled, shook hands, removed our shoes and entered. There was one bench, but we all sat on the mat covered floor. Oehr opened fresh green coconuts, and we drank the thirst quenching milk with the first pure Polynesians I had ever known.



**A Tokelau-style rectangular fale with the square Congregational Church.**

Malika smiled and continued folding up the family’s sleeping mats and placed them in a neat pile beside a large wooden chest. The baby gurgled and played under a covering of netting extending from the rafters. Some children, smiling shyly, sat on the perimeter of massive coral blocks used to retain the fine white coral flooring of the fale; others, more daring, leaned against the uprights supporting the thatched roof. Tani raised the one remaining closed set of overlapping, mats which formed the walls of the building.

Conversational communication was difficult. Oehr’s English vocabulary was even smaller than Tani’s. It was obvious that he was trying to tell us something; that

he was worried; that he wanted us to understand. He repeated over and over: “Me boss;” “Big boss Pago Pago;” “Afraid;” “One year;” “Me Tokelau.”

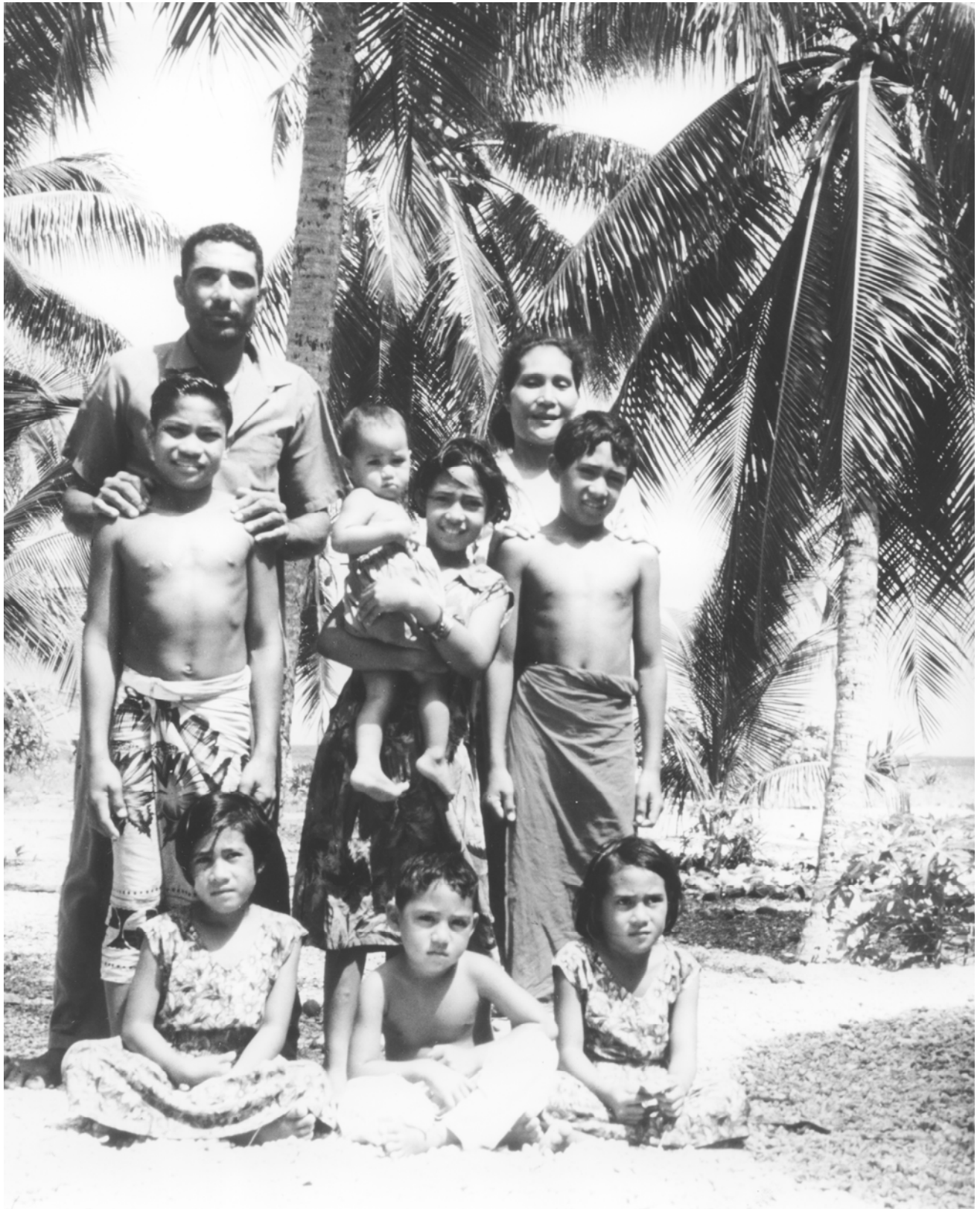
We interpreted this to mean that he was from the Tokelau Islands and had been on the island for a year. He was obviously the ‘boss’ or ‘head man’ of some activity, but he was afraid of the ‘big boss,’ probably the owner in Pago Pago. We didn’t understand why he was upset. The acting Governor of American Samoa had talked with Brad and the radio operator the night before, and permission had been granted to make the measurements. We finally understood when Brad arrived and gave us the full story.

Oehr was the plantation manager for the owner, Wally Jennings, who lived in Pago Pago. All the arrangements for our visit to Swains had been cleared with the American authorities in Pago Pago, but authority on the island was divided: Pita represented the government; Oehr represented the owner. This division was causing hard feelings between the two. In this instance each felt that he should be in charge. Pita had cleared through government, channels, completely ignoring Oehr and the owner. Oehr, without instructions from the owner, felt that he had no choice but to refuse permission.

Here we were, two hours from zero, in a complete deadlock. Everything came to a standstill. It was Sunday and the radio operator could not establish contact with the Samoan operator. Brad’s brows were now wrinkled, not in through, but in worry. He needed to be set-up and ready to operate the station at 10 a.m. It takes some time to dig a pit to bury the equipment, pack it carefully, cover and compact the earth before making the final recording connection. He decided to go ahead and make a clandestine measurement if the permission was not forthcoming in time. He felt the measurement was important to do simultaneously with the ocean drop; and also that the owner, when he could be contacted, would surely give permission.

Oehr was nervous because he wasn’t sure he was taking the right course of action; Brad was nervous because he planned to take a ticklish local political situation in his own hands; pita was nervous because he had been instructed by his boss, the acting Governor, to extend every aid to the University of California scientists; I was nervous, because the whole atmosphere seemed to be about ready to explode.

“Bong, bong, bong.” The church bells started calling the villagers to the ten o’clock service. Oehr, dressed in a white shirt and white lava lava, waked toward the church with his prayer book. From the opposite direction Pita, flanked by his two brothers, headed for the church. Villagers, in Sunday white, came from all directions across the malae. Jack, Royd, and I followed the faithful with our cameras and tape recorder and took a seat in the last pew.



**Oehr, the Swains plantation manager and his family.**

Jack switched on his recorder as the service began. I hoped that it would last an hour so that Brad would have time to make his measurements, and that Pita and

Oehr would remain throughout. Church was a wonderful experience. The unaccompanied singing was magnificent! Oehr, in the third pew, was the lead off singer. After he sang the first few notes of a hymn, the congregation joined in. The children followed along as best they could, but they couldn't sit still. Every few minutes another pair of brown eyes would peek over one of the pews in front of us. When we smiled at them, they quickly disappeared. The long dramatic sermon was given in Samoan. The minister held his congregation in rapt attention. The final hymn and benediction were given before Oehr and Pita left. The time was five past eleven.

We shook hands with the minister, his wife, the elderly ladies and the entire congregation, but our thoughts were in a palm grove with Brad on the far side of the island. But, he wasn't on the far side of the island! We saw him approaching across the malae with a spring in his step, a smile on his face and two telegrams in his hands. The messages had arrived a few minutes before zero. One was in Tokelau to Oehr from the owner saying that he approved any experimentation that Brad wanted to do on the island and to extend every courtesy; the other was from acting Governor Aspinall of American Samoa: TELL JENNING REPRESENTATIVE THAT DR. BRADNER'S WORK IS ESSENTIAL TO THE UNITED STATES AND JENNINGS REPRESENTATIVE SHOULD COOPERATE WITH DR. BRANDER'S WORK. THIS IS AN OFFICIAL REQUEST. IF NECESSARY WILL TALK TO REPRESENTATIVE ON RADIO.

The village suddenly became overwhelmingly hospitable. Oehr indicated in pantomime and a few words of broken English that we were free to take the coconuts, the outrigger canoes and even the coral from the beach. The island was ours.

Jack set the tape recorder on the church steps and played back the morning service; I took Polaroid pictures of the assembled group as they stood around the church entrance. The children surrounded us; the parents invited us to their homes; the camera worked overtime. A Polaroid camera is an absolute essential when traveling through unvisited areas in the South Pacific.

A dozen children, led by Tani, took me on a tour of the village. They showed me through the copra shed and pointed out the large rollers under the trays filled with drying copra. The rollers made it possible to easily place the drying copra in the sun and quickly return it under the protection of the shed during rains. Since this was Sunday, the drying trays remained in the shed. Each child showed me his family's garden of bananas and taro. They introduced me to the only horse on the island, pointed out the belt road and took me past the cemetery.

Tani took my hand and the encircling children danced and laughed and played as they started down a well-defined path through the plantation toward the lagoon. They were all talking at once and pointing out interesting trees and beautiful flowers when I heard something familiar....a few words of French. I stopped to see which child was speaking, but the French words ceased. I started speaking French, watching each little face for a glimmer of understanding. Nothing. That was the only French I heard spoken on the island. I surmised that perhaps one family had come from one of the Society Islands, the nearest French language area. Undoubtedly, a couple of shy youngsters became tongue tied when someone understood their secret language.

The lagoon was beautiful and looked a little like a high mountain lake, except that the forest was palm and the sounds were of the surf a few hundred yards away. Any entrance to the lagoon from the sea had closed up many years before and a tall stand of coconut palms camouflaged any indication of a former channel. The fresh water is slightly brackish so is used only for washing; the drinking water comes from storage tanks in the village. During the week and on Saturdays, the children swim and play here, but this was Sunday. However, they did play games with me, and I taught them the "Hokey Pokey" and "Peas Porridge Hot." I was always surrounded by more than a dozen youngsters. We would rough-house together; they climbed all over me; they taught me the hula.

Jack and Royd had their following of children as well. I could always tell where the men were because they had taught the children the "Symphony Song," and I heard the "Zoom, zoom, zoom," of the big bass drum or the "Tweedle, tweedle, tweedle," of the piccolo coming through from a distance.

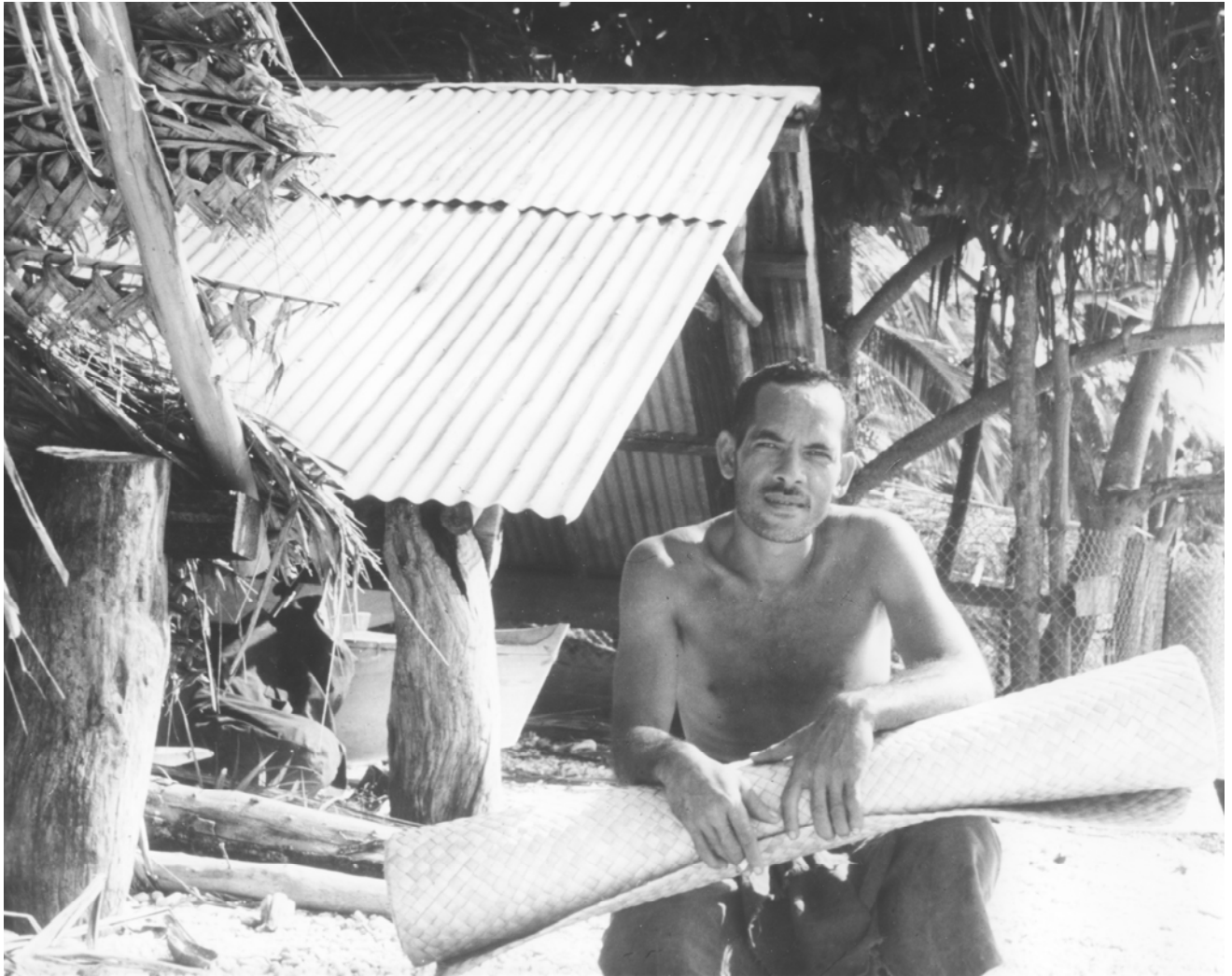
The village was full of grown-ups and little children. But I saw no teen-agers. Where were the beautiful, exotic, curvaceous wahinis of South Sea fame? I learned that they were in Pago Pago. As soon as the youngsters complete the primary grades in the one room thatched schoolhouse, they are sent to American Samoa to continue their education.

At each fale we were served coconut milk. I drank at least two quarts of liquid during the day, and since I was followed continually by the children a walk out into the woods was impossible. Language barriers were great when I mentioned such words as 'toilet' or 'bathroom.' Finally a youngster understood. She said 'lavatory' and led me to the one near her family's fale. It was similar to the Chick Sale of early days on the farm, but it was built of beautifully woven mats for walls, heavily thatched roof and open toward the surf, sea and horizon. The youngster's English vocabulary was small but she was prepared with the necessary words for adjustment to civilization in Pago Pago.

Brad escaped a large following of children. The village elders had cautioned the children to stay far away from the grove where the land station was located. The children and their parents treated Brad with the highest respect and deference. He was always referred to as the Doctor or the Professor. Even those who knew no English used these two words at every opportunity. The children did take his hand cautiously when he came into the village but were quiet and solemn. Two of the village men had attached themselves to Brad as his assistants. This relieved Jack and Royd who enjoyed being able to spend most of their time with the villagers.

Jack and Royd were born traders, and bartering in the South Pacific was one of their favorite occupations. I wanted to try my hand and so, following their instructions, I started out on my first trading venture. In Oehr's house, I admired a beautifully carved wooden box with a tight fitting lid held in place by a twisted coconut fiber. I showed some things from my bag, a sweat shirt, a piece of abalone shell jewelry, surplus clothes (one always travels with too many clothes). In my most persuasive manner I offered several items from my stores for the box. The answer was no. Oehr then ceremoniously came over and placed the box at my feet and said "for you..... present.....you remember Swains." I didn't know what to do. Should I accept the present? I asked Jack and Royd but they had no advice, only the comment: "That's not the way to do it; he doesn't trade properly; he doesn't know the rules." I thought of the copper enamel pendant on a long chain that Bari had made. I gave it to Oehr and told him about my daughter, where she was, what she looked like, and how she had made the pendant. I don't know how much he understood of the conversation, but he did understand that it came from my daughter. He placed it around his neck and wore it proudly.

My only other trade on Swains was a package of cigarettes, for a beautiful Tokelau mat of a geometrical design woven with different shades of brown reeds. It all started when a young Swains Islander followed me around while I was taking pictures. Rolled up under his arm was a baby's sleeping mat. When there was a lull in photography and conversation, he approached and handed me the mat while pointing back towards Oehr's house and saying, "Cigarettes." There was a pack of cigarettes back among my trading things. This did not seem to me to be a fair trade at all, but he was most insistent. During our bartering, I learned that his wife was nineteen years old and they had six children. We walked over to Oehr's fale and made the trade, but I gave him presents for his wife and children. This eased my conscience, but I decided that I was never meant to be a trader. The Swains things were all much more beautiful than anything I had to offer. However, Jack and Royd in true South Sea Island trading fashion were beginning to pile up quite a supply of treasures.



**Rolled up under his arm was a baby's sleeping mat.**

We were beginning to get hungry because we'd had nothing but coconut milk since our hurried cup of coffee on the ship. We had food in our bags down on the beach, but we were still surrounded by children. I gathered them around me and led them off in one direction while Royd and Jack went down to the beach to pick up our food. Almost immediately I found myself at Oehr's where a Polynesian meal had been prepared for us. We sat on the mat covered floor in the middle of the fale; one youngster kept the flies off the food by fanning it with a towel; another brought me a basin of water and a towel to wash my hands. Food was set out for only the three of us. I understand that by tradition this is the way guests are treated. We felt a little embarrassed sitting and eating in front of our hosts, so Royd passed our food to them. While we ate Polynesian chicken cooked in a rich broth thickened with tapioca and seasoned with curry and other spices, fried breadfruit and eggs, they ate our peanut butter sandwiches, dill pickles, carrot sticks, and cookies. I noticed that Royd was not eating much and afterwards asked him why.

“I couldn’t face that chicken head with two eyes staring at me from the center of the bowl.”

It was difficult to learn much about the history of Swains. The islanders listened attentively to our questions but their understanding was non-existent. We listened to their answers attentively but our understanding was non-existent. Our two translators were busy elsewhere; Pita in the palm thicket with Brad and the instruments, the minister preparing his afternoon’s sermon. We did learn that the Polynesian name for the island was Olosega.

Very little is known about Swains Island. The history is a mixture of Tokelau legend and sketchy accounts of early navigators. There were natives on the island when it was discovered in 1606, a beautiful people. A few years later, it was conquered by a band of marauders; the men were killed and the women taken away as wives. The Chief of Olosega left a curse and for two-hundred years attempts at settlement failed.

In the middle of the nineteenth century a successful settlement was established. Eli Hutchinson Jennings, an American, and his wife, the daughter of a Samoan Chief, settled on the island. They brought Polynesians from other islands with them. They planted, tended and harvested coconuts and created a prosperous copra plantation. The Jennings children and grandchildren were born there, and still own the island. Legal documents in Apia, Pago Pago, Washington, and New Zealand provide the recorded history. It was not until 1925 that America adopted legislation which formally made Swains administratively a part of American Samoa. In that year the United States Navy came and hoisted the American flag, sixty-nine years after it had been originally raised by Eli Hutchinson Jennings.

The native population of the island, which consists of plantation workmen and their families, is limited to about a hundred people. They work on the plantation five days a week, play cricket and fish on Saturdays and attend two church services on Sunday.

In the afternoon Brad and I called on the minister, whose fale was close to the church. He greeted us in English; conversation was still difficult, but there was communication. He had studied for the Congregational ministry in Samoa. His fale was decorated with photographs of his relative, of his wedding, of close friends. There were books and papers. He took us to visit the school, an open sided thatched hut with a large blackboard at each end and two heavy wooden chests filled with books. His wife and children were dressed in Sunday white and we took several pictures of the family which he placed beside the wedding picture. He formally invited us to the three o’clock service.



Until it was time for church, Brad and I visited and took pictures of most of the families. Pita had made one request, that we take a picture of his ailing grandmother. Brad put a roll of color film in the camera, while the family helped dress her in a brightly colored native costume. She was old and crippled and nearly blind, and could not move from the mats on which she was resting. We opened the overlapping wall mats to get as much light as possible inside the fale. Grandmother raised herself on one arm and produced a toothless smile. The resultant photograph brought tears to Pita's eyes. Meantime, in the back of the fale the rest of the relatives changed from their Sunday white, the men into lava lavas, the women into ankle length straight wrapped skirts with billowy over blouses reaching almost to the knees. One small boy burst into tears because his mother covered his naked body with a knee length piece of material. Later this same boy gave me a bag of sea shells he had collected on the beach.

We joined the villagers walking across the malae for the afternoon church service. This afternoon the minister was prepared for American guests. He welcomed us and gave the introduction and text of his sermon in English. The singing again was magnificent, and since Brad loves to sing, he started following along. The woman in the pew ahead of us gave him a song book, and the minister announced the page numbers in English as well as in the native tongue. For the better part of an hour, we sang hymns in Tokelau.

The church was light and airy. The square window frames did not contain glass so the trade winds carried the flower fragrance through the chapel during the service. Large jars of local foliage stood behind the alter rail, but the alter cloth was an import, a brightly painted silk scarf depicting the Eifel Tower and London Bridge.

Brad shook hands with the minister and took off immediately for the palm thicket and the afternoon measurement. The children accompanied me to a gathering at Oehr's house. I was given the place of honor on the bench surrounded by about twenty villagers at my feet. I smiled and shook hands with everyone and nodded, and gave a short speech which no one understood. A woman answered and I didn't understand. Then we smiled some more. Insects are prevalent on Swains and I had a can of spray repellent in my bag. I sprayed my ankles and the tiny flies disappeared. I sprayed my hosts' ankles over and over again. If there is something interesting going on, conversation is not essential. Oehr and Malika smiled and motioned to me to turn around. There was Tani with a large net-covered fishing float in each hand. "For you." I put my arms around her and gave her a big hug. She smiled, touched my arm and said, "Friend."

The ship had completed the ocean drop successfully and returned. The crew came ashore. The village accepted them right away. As each man debarked from the

skiff, he was surrounded by children who took him to their homes, to the copra shed, to the lagoon. The crew carried on a successful trading expedition, and acquired treasures of mats, glass balls, and sea shells. The children sang and did the hula. The crew played games and carried the youngsters around of their shoulders.

Brad was anxious to get under water at the edge of the reef where the water is deep and clear. It was Sunday, the day of rest, and diving is considered part of the work week, but the minister gave Brad and two of our crew member permission to dive. The sea life was abundant. The fish seemed totally unafraid of people, inquisitive instead. Sharks, usually to be found at the edge of a reef, were not seen. We did not see a single scar from shark attacks on the Swains islanders. Fish are usually caught by crudely made hooks, but the boys and young men are excellent swimmers and often dive for delicacies at the edge of the reef. Brad left his face plate, swim fins, and snorkel on the island to be shared by the swimmers and divers.

Toward the end of the afternoon, I felt that I wanted to be by myself for a little while to enjoy this isolated place. I convinced the children that I wanted to be alone and went for a walk on the beach. It was white and deserted, and before long the village and meeting house had disappeared as I walked along the outer curve of the island. The horizon stretched in all direction....the DWYN WEN lay to in the deep water off the reef, her sails pink in the setting sun. Several outrigger canoes were tied up along side. The soft sounds of ukeleles, guitars, and voices floated toward shore.

The mood was broken by a, "Hi, there," from Brad. He was at the edge of the thicket with his two helpers preparing to dig up the land station and transport the equipment back to the skiff. On the oscilloscope he showed them the wiggly green line displaying the background motions of the earth. When he pushed against a tree, the line reached a sudden peak. Jumping on the ground disturbed the seismometer enough to make the oscillations cover the complete screen. The Polynesians did the same, then roared with laughter when they made the green line dance.

When we turned we found that many of the villagers had disappeared into their homes. They were writing letters for us to take to their friends and relatives Pago Pago. This was the last time in several months that they would have a chance to send mail.

The time for departure had arrived. The islanders loaded us with gifts: stalks of bananas, baskets of husked coconuts, Tokelau mats, fishing floats, sea shells and wooden carvings. I waited on the beach for the skiff, watching it make repeated trips to the ship. The children and I talked and sang and danced. The adults were either in the background watching or helping the crew load. I waited until the last trip. The children helped me walk the hundred yards across the partially submerged coral reef.

I shook hands with each one several times repeating, “Fatai” and “Te alofa.” I told them as best I could that I hoped someday to be able to return. At the edge of the reef where the ocean dropped off precipitously, each child, even the toddlers, threw his arms around me, repeating over and over, “No go, Marge, no go, Marge.” I hated to send them back to shore, but we couldn’t stay, and they couldn’t go with us.

This island is only about 200 miles north of Samoa. I suspect that its obscurity is deliberate, and that the owner wants to keep it as an example of an unspoiled Polynesian paradise. It certainly is a paradise now.

## CHAPTER VI REFLECTIONS

Everyone talked at once. Each of us had had experiences that we thought unique. Our sex-starved crew had gone ashore hoping to find friendly wahinis, returned to the ship enchanted by the wonderful friendly Tokelau children. I was enchanted too. Each of us remembered one special child. Tani was mine. I could see her in the dusk at the edge of the reef waving my old white sailor hat. Big Jim's friend, a young boy of about eight, wept when Jim broke away and returned to the ship. George's friend helped him carry his Swains treasures across the reef to the skiff. One proud child walked with the village elders as they escorted Brad to the skiff repeating, "Te alofa, Doctor; te alofa, Professor."

My bunk was covered with Tokelau mats, glass balls, drying Land camera pictures and sea shells. I could not spend the night there. The barometer promised a series of squalls, so I ruled out sleeping on deck. The bench in the chart house was too short for me, so I compromised on a couch in the salon. I took the one that ran crosswise of the ship, a ninety degree angle from my normal sleeping direction. The ship's motion in this direction gave me a continual rocking massage instead of the usual rolling. I found it comfortable and restful, and fell asleep immediately dreaming of the most beautiful island and people, I'm sure, that exist on the face of the earth.

American Samoa, our next stop, was a full days sail from Swains. During the evening we passed Western Samoa, the only independent country in Polynesia. Royd and I hatched plans to visit that island during our few days stop over in Pago Pago. We knew from friends of past expeditions that there was an inter island boat and infrequently scheduled flights between American Samoa and Western Samoa. Airplane flights! That was an alien idea after the weeks of empty ocean. I began thinking of civilization: real buildings, flower gardens, automobiles. Sudden pangs of homesickness followed the thoughts. I wanted desperately to hear from and to talk to Bari. Similar nostalgia was affecting all the crew.

Everyone wanted to write letters. We were thinking of home. We had not had a chance to mail or receive letters for several weeks. The fellows talked, not of the excitement of sailing the seas, or of the availability of wahinis at every port, or of their exaggerated experiences, but of home. Hoping for, but not daring to expect, letters. Even Dirty Dave was writing a card to his family. I was reminded of the report of the first time Dave's family had visited the DWYN WEN in Long Beach. His parents, well-known, well-dressed, a prosperous Pasadena family, came down to the ship and asked for their son David. The man on watch called down the

companionway, "Hey, Dirty Dave, your folks are here." Dave, socially prominent, appeared with uncut hair, scraggly beard, bare calloused feet, bulging muscles, and wearing only an outgrown, ragged, dirty pair of faded shorts.

Most of the crew had failed to include paper and pencils among their personal supplies, so I passed out the essentials. The continuous letter which I had been writing to Bari ever since leaving Kailua now ran to about twenty pages. One of the fellows couldn't imagine what I was writing about at such length. After all, he said, "We left Kailua and there was a storm. We stopped at Palmyra, crossed the equator, and stopped at Swains." He asked if he could read Bari's letter, then asked if he could copy sections of it. The first thing I knew sections of the letter were being copied by everyone. The pay-off came when Jack wanted to photograph the letter page by page and send the film home! At this point I put my foot down. It may have been an account of the trip, but it WAS a personal letter to my daughter. I did, however, add a couple of carbons and made copies for Bob and Forrest.

Royd was prepared for letter writing, but he had seen me using carbon paper and asked to borrow a couple of pieces. He was corresponding with three girls: one in Berkeley, one in Los Angeles, and Melanie in Chicago. Melanie, I noticed, got the original. I had picked up a lot of post cards in Kailua which were now written and ready for mailing in Pago Pago. All cards, letters, notes, reports were written at sea, as we did not want to spend any of our shore time writing.

John was writing to his parents in the San Diego area. Early in the expedition he had spoken briefly of them, when he talked about the surf at Wind-and-Sea Beach, the Mission Bay Channel, and Hot Curl. John had graduated from Hoover High a few years before and had started to follow the profession of flag-pole painting, until the sea called. John, more than any of the others, became interested in the experimental work of the expedition. He would try to trade watch to be on hand when the tapes were run through the oscilloscope. His diving into the sea to grab the tag line made him an integral part of the summer's data collecting. John was writing to his parents about the seismic work, and about the daily experiences on the Schooner. He was living deeply in the family of the DWYN WEN....the world of the DWYN WEN. But a softness came into John's eyes as he talked about Mom and Dad and home.

Big Jim did not have a family. His father had died when he was very young. His mother had been murdered when he was in the Marines, and he was waiting until his twenty-first birthday to return to Philadelphia to investigate personally the unsolved crime. However, Jim was writing a letter to a Tahitian boy on Moorea. The boy could not read English, and Jim couldn't write in French or Tahitian. So I helped him translate his message into French. Big Jim, sometimes called Animal

Jim, was very strong, high strung, and quick tempered. He was also insecure and sensitive, and his response to any real or imagined slight was a quick retaliation with his fists. At the same time he was warm and loveable and the most generous man on board.

Gorgeous George was our Adonis. Tall, handsome, broad shouldered with long wavy hair and a carefully trimmed beard, he had spent a year at San Jose State before going to Hawaii for a summer and ending up on the DWYN WEN. George was relaxed about writing, confident that he would receive a letter whether he wrote or not.

Early the morning before we reached Samoa, the skipper asked me to take the helm while he helped put up the sails. M. Bradner, helmsman....or helms-woman! I had made the grade. The breeze had freshened during the night and it looked like a sailing day. Bob was still in his bunk. The crew wanted to hoist the sails without his knowledge. He agitated to put the sails up at every fair breeze and always rushed aft to help. Bob loved science but sometimes I was convinced that he loved sailing even more. We had barely started when Bob came dashing out of the chart house pulling his shorts on with one hand and grabbing a rope with the other. He hauled on the rope with all the strength in his 125 pound frame. Originally he had been scheduled to leave the ship in Hawaii, but circumstances had changed so that it became desirable for him to continue to New Zealand. One problem that had to be faced in Samoa was his visa. If a visa was un-obtainable, he might have to remain on board in Auckland and return to the United States with the ship via the Cooks, Tuamotus, Australs, and Tahiti. Bob did not seem particularly distraught.



**Bob hauled on the rope with all the strength in his 125 pound frame.**

By mid-afternoon, American Samoa was just over the horizon ahead of us. The breeze had become gentle. It kept us on course but did not produce much speed. We did not mind, because we would have to lay off the island until morning anyhow, when daylight would help Stan enter the harbor.

We were a relaxed peaceful family. Bob and Forrest played a long cribbage game. Jerry lounged in a corner with his guitar. I played monopoly with the stooges. Even Brad was contented with a book. Jack brought in a tray-full of chocolate cup cakes. Royd by force of habit fiddled with the radio dials to no avail; the radio had been uncommunicative since leaving Palmyra. It was a beautiful calm evening. Tomorrow would bring us to civilization, to meet old friends, to gather fresh supplies, to see newspapers, to drink cold beer, to find a fresh water shower, and to get MAIL.

In the early dawn, the rugged volcanic outline of Tuituila appeared. Below the heavy clouds on the mountain peaks, the vibrant green rain forest dropped precipitously to villages clustered in small valleys or along the shore. An occasional automobile or truck bounced along the road that hugged the shoreline. A small plane dropped from the sky for a landing. Would I be on this plane in the next day or two, heading for Western Samoa and another adventure?

The harbor entrance was marked by a lighthouse, but the harbor itself was hidden behind steep mountain ranges until we rounded a point of land. Mountains, dropping to the sea, flanked one side of the opening. The other side was terraced by fringes of lava rubble which left a band of level ground wide enough for the road and a few buildings. The mile-long channel had a bend in the middle. At the apex of this bend we could see the white frame cottages of the Rainmaker Hotel, where I hoped we might find a shower. The upper end of the harbor is the most active port in the South Pacific. Ships of all descriptions were at the docks or at anchor. At the far end, the mountains reach to the sky and drop just as suddenly on the other side. Pago Pago had been attacked by the Japanese from beyond those mountains; shells arched over the high ranges and fell on the city. The angled harbor gave protection against any direct approach from the sea.

We entered the upper harbor about eight a.m. A group of fifty children, in identical jumpers, were doing morning calisthenics on the grass in front of a school. The open-sided island busses careened along the narrow road. People were entering the government and communications buildings that dominated the center of the town. Green lawns, majestic palms, plumeria, and hibiscus made a shoreline park.

A large German freighter was tied up at the main dock. Japanese fishing boats were lined up at the tuna cannery. Sail boats were moored to buoys in the harbor.



The Inter island boat for Western Samoa was filled to overflowing. An official-looking LST headed directly toward us and came along side. The Harbor Master and Customs Officer jumped on board and went over our papers with Brad and Stan. Everything was in order. We were escorted to our mooring near the main dock.

All this time I was scanning the shore line for Walter and Judy Munk. Walter is the director of the Institute of Geophysics and Planetary Physics at the University in La Jolla. With his family, he was spending the summer in Samoa operating one of the stations for the Wave Attenuation Study. I finally saw Judy waving from the dock. With my most persuasive smile, I asked the officials if I might go ashore with them. Almost before their affirmative answer, I jumped to the LST, and heard the unanimous cry from the entire crew.

“Check on the mail, Marge!”

## CHAPTER VII NEAR CALAMITIES

On the short LST trip to the dock my mind was not on mail, but on the delightful friends waiting for us. Walter was barefoot, in Bermudas, a string of the blue-grey seeds called Job's Tears around his neck; Judy, tall, beautiful and as lovely as ever, was wearing a flower bedecked Samoan wide-brimmed hat. Brad and I scrambled up the dock into their arms. Others were also there to greet us: Capt. and Mrs. Stout of the Kanaloa, the ship Brad had chartered for experiments off the Hawaiian shelf the year before; and Wally Jennings, the owner of Swains Island. When Brad started to review our activities of the past six weeks, I excused myself and dashed the half block to the post office.

“Any mail for the Schooner DWYN WEN?”

The postmaster in his slow unhurried Samoan way wandered around the post office, looked through mail, picked up a letter and said, “Mr. Silfast?”

“Yes.” Gorgeous George had his letter, now for the rest of the anxious crew.

Again, “George Silfast; George has another one.” Final count, George received twenty-two letters, all from the same girl! Royd got his three. The rest of the crew averaged one or two apiece, but there was nothing for me. I rejoined the group at the dock with a very long face. Walter immediately recognized my near-surface tears and understood. He explained that our mail had been sent over to the office of Burns Philps, the shipping broker. “Climb into the jeep and I'll run you over.” He had rented the only available jeep on Samoa, bright baby pink, with clashing candy-stripe pink canvas top.

The shore boat was just arriving from the ship, so I rushed the mail to the crew before joining Brad and Walter in the jeep. Pago Pago was lovely that morning. Filled with excitement, we looked forward to a few relaxed days on Tuituila. Experimental work was down to a quick operation and should proceed routinely, so that scientists and crew alike would be able to enjoy civilization. Everyone we passed smiled, nodded and waved. We looked forward to the fulfill-men of the translation of our ship's name ‘pleasant expectations’ in Samoa.

Four days later when we left, our pleasant expectations had been all but shattered. The Talking Chief of Vailoatai had died; the seismic sphere failed to return from the bottom of the harbor; the land station burned out; a garbled cable to Washington gave a negative rather than an affirmative answer; the Munk children picked up a case of hook worm; I was thrown off the plane to Western Samoa. But I'm getting ahead of my story.

To Brad, of course, business came first, so we detoured to the communication center to place a phone call to the La Jolla laboratory. Then the mail. There were several letters. The long awaited one from Bari, I read and reread it many times. She was enjoying her summer job at Scripps as a laboratory helper in physics, and for the first time had become interested in mathematics. She was even considering taking a math course at 'Cal' during her freshman year. Her letter was happy, interesting, and carefree. She missed us but was enjoying her summer experiences. There were letters from family and friends too, and some business letters that I thought could wait for an answer until I was again at sea.

I felt that the important things were taken care of. Now I wanted to ride around Pago Pago and gather impressions of the busiest port in the South Pacific. I didn't have much time as Brad wanted the jeep right away to go and set up the Land Station. Walter had found a place on the open-air concrete floor of a building not far from the village of Vailoatai where he and Judy were living. Walter drove. Judy, Brad and the Land Station filled the front seat. Jack, Royd, Big Jim, and I perched on groceries and clung precariously to hand-holds, as we bumped along the rugged Samoan road in the aged jeep. We passed the dock where we saw the crew coming to shore with laundry, cameras, letters to mail. A sudden screeching halt in front of the post office startled us, but the jeep was obeying the only stop sign on the island of Tuituila. We passed the Rainmaker Hotel, where there were no accommodations. That famous place appeared to be just a series of unimaginative huts. Other scenes unrolled as we drove out of town. Traffic was light. Most filling stations doubled as grocery or dry-goods stores. The high school and hospital were new and modern. A group of Samoan youths were swimming in the Olympic length practice lanes cut out of the rocky shore. Samoans and Palangi (non-Samoans) strolled along the road conversing with friends or walking to the next village. We passed the airport and learned that flights to Apia on Western Samoa left every third day.

As we got farther away from Pago Pago the homes and villages became attractive, less influenced by the commercialism of the town. The fales were built with thatched roofs and the floors covered with mats. The clotheslines held brightly colored lava lavas and muu muus rather than ragged faded western clothes.

Finally even the occasional signs of habitation ended and the tropical rain forest took over. The paved road left the sea and degenerated into a dirt trail which eventually reached the south side of the island along a rocky coast where fifteen foot waves crashed and spewed foam against the cliffs. Large signs on the rim, one in Samoan the other in English, stated Danger, Kapu, Forbidden, and Stay Away. This was the area where Walter had installed his instruments for the Samoan Station of the Swell Attenuation Study.

Farther along we rounded a bend and had our first breathtaking view of the village of Vailoatai. This village, by virtue of its setting, planning and architecture is reputed to be the most beautiful village on Tuituila, and one of the most beautiful in all Polynesia. The fale are distributed around a large grassy malae the size of a football field. On this day Samoans had gathered in small solemn groups around the central ceremonial fale, which was decorated with ancient woven mourning mats. The old Talking Chief had just come back from the hospital to die. Friends and relatives from other villages had come to pay homage to a great and beloved man.

We piled out of the jeep beside a new fale, one built by Chief Satele for the Palangi scientist and his family. The Munk girls, Kendall and Edie, ages four and seven, were playing on the grass with their newest pets, two chickens tethered to a nearby palm.

We removed our shoes and entered the fale. It was open on three sides giving three distinct vistas: the pounding surf, the grassy malae, and nearby fale. Attached to the back of the fale in a lean-to was the kitchen and laboratory. The kitchen contained a two cubic foot gasoline refrigerator, a two burner kerosene camp stove, and a fresh water supply in a large lister bag hanging from the rafters. The laboratory recording instruments were crammed into a small corner, along with one chair and Walter's minute desk. The instrument shipping crates provided ample storage space for clothes, books, and supplies.

The fale had been decorated by the village before the Munks' arrival. Long strips of tapa cloth were interlaced in the eaves of the thatched roof. Newspaper strips, cut in intricate designs like unfolding paper dolls, and silvered cigarette wrappers garlanded the ceiling. Judy had used a bolt of red and white cotton cloth with plumeria designs to make mattress covers, a spread for the large double bed, table cloth, and drapes to close off the attached kitchen and laboratory. The table legs were set in large cans to keep the rats from reaching the food on top.

As soon as Walter finished showing the Vailoatai experimental set up to Brad, they took off in the jeep toward the next settlement where Walter had made arrangements with the matai for the use of the lower room in his two story fale.

Jack and Royd left with cameras and tape recorder to get acquainted with the village. Big Jim immediately became attracted to the Chief's daughter Fonga, the Village Virgin. After a few moments of shyness they relaxed and soon headed off gaily for the swimming beach with the Munk girls. I stayed with Judy to get caught up on the news from home, her reactions to life in the village, and to give an account of my weeks at sea.

Our shipboard radio had been inoperable since leaving Palmyra, so the Munks had had no news about the DWYN WEN until three days before our arrival. The

news had come from Wally Jennings who had driven his bus to Vailoatai to report the visit of the DWYN WEN at Swains, and to ask permission for the ship to bring the mail and ten crates of chickens to Samoa. We had never gotten the word. The mail we brought automatically. The chickens would have completely filled our after deck, and since Polynesian fowls are reputed to be poor sailors we felt fortunate.

Judy had been enjoying her life in Samoa. Walter had been made an honorary chief of the village, and Chief Satele's wife had taught him the motions of the native Samoan dances for his inaugural party. Also the 'old ladies' of the village had been working for days making costumes and preparing for a village dance in honor of the DWYN WEN. But, with the death of the Talking Chief, the fete undoubtedly would be cancelled.

There was a screeching of brakes when the jeep rounded a bend in the road and came to a sudden halt in front of the fale. Walter and Brad gave an aura of gloom and depression. We knew that something catastrophic had happened. Even with careful checking and rechecking Brad had made a wrong connection, and the Land Seismic Instrument had burned out, the only one we had! We returned to town, the ship and the electronics cabin as quickly as possible.

The instrument had to be repaired because land measurements were a critical part of the summer's research. So began a period of almost four sleepless days and nights for the scientists of the DWYN WEN. Brad, Forrest, and land station retired to the seclusion of the ship. The crew, except for the first mate who was on watch, had disappeared in Pago Pago. Alone in a strange busy South Sea port, I put on a clean, though badly wrinkled muu muu, and set out to explore.

In the center of the town there was a level grassy square. A narrow park of grass and palm bordered the rocky shore. Samoan women sold native handicrafts in a thatched building in the park. The main shop of Pago Pago, not much more than a series of shacks, huddled against the steep hillside; a few buildings, approached by steep narrow paths, clung to the mountain above them. The communications center and the Samoan government offices faced the square.

The street level of the government building contained the jail, used mainly for drunken seamen off the large freighters. The cells filled up while the ships were in port; the men were released to their officers when the time came for departure. I browsed the shops and found that each one carried exactly the same wares as the next. I stopped at a book store to try and find a book on the history and geography of Samoa but none was available, nor in fact anything that would lead you to believe that the store was in the center of the Polynesian triangle. However, it did have a fine post card rack and I purchased enough cards to keep me and the crew busy writing on the next leg of our voyage.

In my wanderings around town I had not run into any of the crew. I was almost afraid to speculate where they were, but I did want to find late afternoon companions. I couldn't return to the ship because Brad and Forrest, I knew, would not welcome interruptions. My one hope was Bob, who was not involved in rebuilding the seismic station. Where would he be? Undoubtedly drinking beer someplace. I passed the bar nearest the square, obviously not the place to find anyone from our masculine crew. Next bar, the Island Moon. It looked deserted, and I was about to pass by, when a shout and greeting reached me from the open verandah. It was Bob. He was enjoying a beer with a tall good-looking Samoan. We soon transferred our operations to the Seaside Gardens, a bistro on the waterfront, where we could get cold Hinano, the Tahitian beer, and where our Samoan friend was to meet his cousin, the Chief of Police. Bob stopped near the doorway to order and I walked across the floor with our friend to join a table of Samoans. I could feel eyes following me as I traversed the room. I turned. There was our complete crew watching. I smiled and waved and sat down with the friendly Polynesians.

Jerry came off watch and relayed explicit instructions from Brad that we were to stay off the ship until 9:30. This dismayed all of us. Jack and Royd had just downed their last beer preparatory to cooking supper. We had invited the Munk family for dinner. Stan commented, "You can't invite people to dinner, especially the boss of the entire project, and then tell him he can't eat until long after the bed time of his children!" Royd went out to the ship. Bob and I went to the boat dock to meet Walter, Judy, and the girls and brought them back to the Seaside Gardens. Walter made a trip to the nearest market. The guest list for dinner increased. The two photographers who were filming an educational film on the Swell Attenuation Study looked friendly, and the Samoan, who had attached himself to our group as liaison between the DWYN WEN and Pago Pago, was too nice to be turned away without food. The police chief seemed a probable guest.

Royd had surveyed the situation on board and sent the watch to the Seaside Gardens to report. The salon was completely covered with electronic equipment, wiring diagrams, and scattered pieces of completely unassembled land station.....but Royd had checked with Brad, and was preparing to serve dinner topside. No one was to go below. Brad had evidently forgotten that his cluttered salon was blocking the way to the head.

The shore boat made several trips to get us and our assorted guests aboard. Stan tried to paddle out in an unstable outrigger canoe and swam the rest of the way. We found two of the sphere anchor plates on deck well filled with glowing charcoal, a plate of 1 1/2 inch thick T-bone steaks, a large pot of fresh corn on the cob. We finished with fruit cake and ice cream. Brad and Forrest joined us just long enough

to eat and to disappear again below. Edie fell asleep on a pad and Kendall on the mid-deck hatch. Two of the crew collapsed from beer on the aft deck. The night was beautiful and peaceful. Jerry strummed his guitar. The darkness of the night was broken only by the dying embers in the barbecue pans and the bright light from below showing through the cracks in the salon skylight. At midnight our guests left the ship and we tiptoed to bed.

Brad was not in his bunk when I awoke in the morning. His bunk had not been slept in. The land station, Brad, and Forrest had disappeared from the salon. Where were they? What was the present status? What was our schedule for the day? Corn Flakes and coffee were tasteless. I raced up the companionway and to the railings when I heard the put-put of the shore boat. Brad and Forrest were covered with mud from head to foot, dark circles under their eyes, tired and haggard, but weariness did not camouflage relief.

They had completed the repairs and reassembly in time to meet the 4 a.m. deadline, only to find that the platform for the station near Vailoatai was not stable enough. They then went in search of a reported World War II gun emplacement on a ridge above Pago Pago. After a rain soaked scramble they located the solid concrete fortification, a truly stable platform. The performance and recordings of the instrument were excellent.

Even before washing up or getting anything to eat, Brad outlined the experimental schedule for the day: a harbor drop in late morning with pick-up around four in the afternoon. As soon as the sphere was on board the ship would take off for the open sea for an ocean drop.

This seemed like an ideal time for Royd and me to take off for Western Samoa, a couple of days when our presence on board was not essential. But we didn't know plane schedules. We went to see the travel agent: the plane left at 10 a.m. and returned two days later; travel permits were needed for Western Samoa. It was now 9 a.m. We didn't know whether there would be time to take care of all the necessary duties on shore. Royd borrowed the jeep to take the laundry to the hospital (the only place in Pago Pago to have laundry done), and to make plans for feeding our hungry crew during his absence. I dashed off in another direction to take care of some of the paper work of the expedition. Between times we did get our knap-sacks packed with just the necessary items: some food, cooking utensils, trading items, sleeping bags, passports, money, cameras, and tape recorder.

I stopped at the government offices to get the permits. At least twenty Samoans were lined up at the window, each one having a long discussion with the official. Loud voices and gestures. I knew there wasn't a chance of getting to the window in the five minutes left for this business. We decided to go out to the airport without

any of the necessary papers and hope that we could bluff our way through the red tape. Brad gave us a hair-raising jeep ride, right onto the field where the plane was getting ready to take off. The agent grabbed our knap-sacks and said, "Hurry-up and get on, we're already late." I was on the plane looking for a seat and beginning to relax when I was asked for my ticket.

"Can't I get one on the plane?"

With disgust the agent said he would hold up the plane while we got our tickets. We left our baggage on the plane and ran into the prefabricated air terminal and were asked, "You, of course, have your permits for travel to Western Samoa?"

I looked at Royd and he looked at me and we had to answer, "No." In the past I've had planes wait for me, cope with my large boxes of flowers, land during the middle of a flight when I was hot and thirsty and wanted a coke, but this is the first time I have ever had my luggage thrown at me from a plane by an agent of an airline.

We stood with our bags and trembled with frustration as we watched the single motor plane pick up speed on the runway and take off. This had been our only chance to get to Western Samoa.

We returned to town. Brad went back to the land station to coordinate measurements with the harbor drop. The ship was in the center of the harbor dropping the sphere, All hands on deck. We spent the rest of the morning ordering double wrapped bread, fresh eggs, and produce.....things that could have been done easily two days later.

The ship moved back to its moorings. The sphere was down. The crew invited some local girls on board: brown skins, warm smiles, candid eyes, beautiful bodies half-hidden by flowered pareos, the ritual exchanges of flower leis and the beautifully made shell or seed leis of Samoa; everyone relaxed, enjoying the sunshine, gentle breezes, good company, strumming guitars and the quiet singing of our Samoan friends. The tensions, always present at sea when the sphere was at the bottom, did not exist here in the harbor. The bottom was only 150 feet below. At pick up time we would watch for the sphere under clear skies, about 500 feet off the starboard bow and send the shore boat out to guide it back for loading on the schooner. The shore boat was making repeated trips back and forth between the DWYN WEN and the Seaside Gardens. We had given up the boathouse as a dock since most of the traffic was between the ship and the beer hall. I stopped at the government offices to deliver some messages to Chief Satele. He commented that he had some free time, so I too brought a Samoan friend on board. The disadvantage of the Seaside Garden dock was the lack of the harbor master's hailing megaphone.



Chief Satele and I waved our arms and called out “DWYN WEN -shore boat!” Someone finally noticed and picked us up.

During the weeks at sea I had become pretty well acquainted with the DWYN WEN. I felt like an expert explaining the engine room, the compressor, the various instruments in the chart house, and all of my descriptions were in the proper nautical terms. When the Chief said goodbye to return to his job at the office of Samoan Affairs, he invited all of us to spend our last afternoon in Samoa at Vailoatai. He said that the mourning for the Talking Chief would be ended, and the ‘old ladies’ were preparing a special dance program for us.

At pick-up time we casually glanced over the surface of the harbor, more interested in the salvage job taking place near the tuna cannery than in the sphere which would surface shortly. The tide had changed the position of the ship slightly so we compensated for this small direction change when we looked out toward the drop point. It grew later. The sphere really should be up. Could the harbor currents be strong enough to carry it an appreciable distance? Brad returned from the land station and brought out the radio. We hadn’t thought we would need the radio on this drop! No signal.

It was now well past sundown. The ship would have to leave soon to get out into the correct position for the ocean drop the next morning. Brad made a quick decision to send Bob out in charge of the ocean drop, using one of the other seismometer spheres. We didn’t know where or when the harbor sphere would return to the surface and be found. If it had been carried toward the mouth of the harbor, it might be mistaken for a World War II mine and cause alarm.

Walter and his daughter, Edie, came on board to sail with the ship and to observe the ocean drop. I went out to Vailoatai to spend the night with Judy. Brad and Forrest stayed on shore to monitor the radio in case the sphere came up, and to notify the harbor officials that it was lost, as well as to operate the land station.

Three stories followed, in three different locations: Vailoatai, Pago Pago, and a ship at sea.

**VAILOATAI:** The evening shadows had disappeared by the time I reached the village, and the only light came from the candles surrounding the funeral bier of the Talking Chief in the Ceremonial Fale. Mournful chanting continued all through the night. In the morning Samoans from many villages came to pay their respects, to bring fine mats and gifts of food, and to witness the burial of a great chief. In the early afternoon he was buried on a little hillock overlooking the sea from which his ancestors had come to this fair land. As soon as the last sea shell was placed on top of the grave, the mourning period ended. The reverent chanting changed to gay

tunes. Food was brought out and the feast began. From the Munk's fale, I had a front row seat for all of the pageantry.

The ceremony did not distract me from one of the objectives of my visit to Vailoatai - a shower. Chief Satele was in the process of building a western style home complete with indoor plumbing. The foundations had already been poured, and water had been piped in and the bathroom finished and enclosed to accommodate the summer palangi visitors. I spent a half hour joyously standing under a trickle of cold water which drained from the shower onto the grass, across the road and finally to the sea. While I was in the shower Fonga insisted on washing all my clothes on a large flat rock, using a bucket of cold water and a stiff brush.

PAGO PAGO: I was a long miserable night for Brad and Forrest. The energy expended to climb to the land station under a dark moonless night was enormous. A few short cat naps on a damp wooden bench in the boat shed were not refreshing. The radio, by their side, was on all night but gave no signal. The uncertainties of the experimental work, now that one sphere was gone, were great. In the morning, Brad skin dived in the harbor to find out what sort of search could be made. Visibility was less than an arm's reach fifty feet down. Divers would have to swim around an axial point in an increasing spiral, feeling the bottom as they went. Local inhabitants gave frightening descriptions of the bottom: tangled wreckage, debris, overhanging ledges that collapsed on divers. Maybe the sphere had been trapped in one of those tangles. Maybe a search diver would be trapped.

Two SCUBA divers who had been working on the salvage operation in the harbor volunteered to try. Together with Brad, they worked out the jackstay search procedure and emergency signals. They arranged decompression bottles, since the dive would probably extend beyond normal safe limits. Brad picked the spot in the middle of the harbor to begin the search and dropped a heavy anchor. The divers descended the anchor line, carrying extra air bottles and two hundred feet of rope to mark off the groping spiral search. Brad waited in the skiff. Before he could make the decision as to his next move, the divers returned. The anchor had landed within one foot of the sphere! The divers had done their job. Now it was time for Brad to put on the tanks and face plate and go below to determine the trouble. At 150 feet in the active harbor, the water was murky and visibility was limited to inches. The fluorescent orange paint on the sphere was about all that could be seen at 150 feet. By feel and touch Brad discovered the difficulty. The release mechanism had failed to work because a turnbuckle had stayed too tight in the shallow water.

During two years of experimentation, off the California coast and in Hawaii, and across the Pacific, this had been the first failure, and the sphere was at 150 feet,

within diving distance! With a few manipulations by hand, the sphere released the anchor and floated to the surface.

**ABOARD THE DWYN WEN:** The crew was a bit apprehensive about having the Director of the Institute, the big boss, on board. The lost sphere in the harbor did not add to their self-confidence. The seas were calm, breezes gentle, conditions perfect. The sphere was dropped overboard, glubbing down to 15,000 feet. The wait. Walter was the only relaxed unconcerned person on board during the tension period. After all, “Brad had been dropping instruments for months in the deep ocean and never lost one. Of course, it will return.” The crew did not share his confidence. Four hours and the radio was activated, no signal; it was still early. Then suddenly, about fifty feet off the port bow, the sphere appeared and the radio blared. The first mate heaved a sigh of relief:

“Whew, we lucked out again!”

I was still at Vailoatai not knowing what was going on in Pago Pago or at sea, waiting for Walter to return with the jeep so that I could return to town. High Chief Satele joined Judy and me in a glass of cold beer. His servant, Silau, brought us a large platter of taro cooked with coconut cream and onions, an excellent snack with beer. He told us sadly about the decline of Samoan village and its art. Most of the men have jobs in town or on the roads and no longer care for the farms and gardens. Much of the produce on the island is imported from the Tongas. The women no longer work at making fine mats and tapa cloth. When the Chief was a young man, the young girls wove mats of the finest hibiscus fiber, and the finished product was as soft and pliable as linen or raw silk. A girl was not eligible for marriage until she had completed her mat. Now, none of the girls make fine mats, even the old ladies have forgotten the art. One unfinished mat hangs in the Chief’s fale and he doesn’t expect that it will ever be completed. Occasionally a Samoan tapa cloth is made, but most of those in use by the villagers come from the Manua Islands or from the Tongas.

Big Jim and Walter returned shortly after dusk. They reported on the ocean drop and the successful search for the harbor sphere. I was delighted that Big Jim was along because that meant that I wouldn’t have to drive back to town alone. But I was mistaken, Big Jim was planning to spend the night at Vailoatai. I had not driven a car in several weeks and had never driven a jeep. Walter took me out for a practice run, explaining where to hit the dashboard when the headlights became temperamental, how to hand manipulate the windshield wipers if it started to rain, how to prop up the striped canvas roof when it collapsed, and he cautioned me about stopping or parking because the jeep would not go into reverse. So, after dark, I started the hour-long drive into Pago Pago.

Big Jim spent the night at the village in pursuit of Fonga. To quote from Judy's diary: "Jim (member of the crew, 20 years, a good beach bum type from Waikiki) came home with Walter and Edie. We really had fun watching him try to make out with Fonga. We are sure that he came with the highest expectations, but they fell flat. We finally set up one of the extra cots in the center of our fale and after great detailed conversations as to how tired he was, he had no choice but to go to bed soon after the children."

The drive back to Pago Pago was a worrisome one. Not only did the jeep have a mind of its own, but it was movie night. The road was lined with Samoans walking, cycling, carrying children, on their way to see the next episode of the Lone Ranger. I swerved to miss some hitch hikers, knowing that I couldn't possibly fit even half of the group into the jeep, and besides I might kill the engine and be really stuck. I slowed down in front of the High School watching for Brad, who supposedly was waiting for me for a ride back to town after taking a land station measurement, but he was not there. Fortunately, the jeep did not give its final cough and choke until I reached Pago Pago.

I found Brad drinking Hinano, looking relaxed for the first time in forty-eight hours. He had given me up and walked back into town. The rest of the shipboard family was also assembled along with guests who were invited on board for dinner, and our Samoan friend of the day before, who unknown to us had invited his friends and relative to have dinner on the DWYN WEN. Stan invited me to ride to the ship in a borrowed outrigger canoe. I joined him, after tossing my camera to Brad. Stan quickly shipped so much water in the craft that we rode with gunwales awash. We didn't actually tip over. Maybe Stan is right, and an outrigger is only stable when it is full of water.

Jack and Royd had been around town long enough to do a bit of trading. They had a beautiful twenty foot square tapa cloth. I have been fond of tapa cloth ever since I bought my first one in Honolulu ten years ago. More than anything, I wanted a large tapa to completely cover one wall of our rumpus room which I had decided would become the display center of our south sea souvenirs. Our Samoan friend and his friends and relative caught my excitement and enthusiasm. One had a cousin, who had a friend, whose wife's family owned a large one. "I'll see if they will sell it."

Whenever I saw one of these Samoans during the next two days, I asked about the tapa. The transaction involved a sick child, a wedding, and permission of the grandmother. The tapa was finally brought on board the morning we left Tuituila. I was so excited that I failed to quibble about the price and ended up paying three times its actual value. But I had my tapa which I displayed at every opportunity. The

crew told me that I had been duped, that I had been played for a sucker, but they recognized my pride in ownership and nick-named me “The Tapa Queen.”

Brad continued to make his twice daily trek to the ridge to record land microseisms. Before the final early morning run he asked if I would like to climb the mountain with him to bring the station back to the ship. I looked forward to this very much as the steep ridge would offer a commanding view of the harbor and surrounding countryside. He cautioned me to wear heavy protective clothing. I dressed in heavy sneakers, blue jeans, and a long sleeved shirt, a bit warm for the tropics but good protection from the underbrush.

We took the jeep as far as possible and walked past the first row of native houses. As we approached the second row the paths became steeper. Occasionally a pair of dark eyes watched us; but when we turned in their direction, they disappeared behind a curtain or a yellow ginger screen. The trail narrowed and vanished after we passed the last out-house and pig pen. Then climbing became a hand over hand effort. We pulled ourselves up step by step using vines, small trees, and shrubs. Often we would take one step and slip back two. The early morning dew made everything wet and slippery. We found a few bits of open space which we followed until we were again swallowed by the dense growth. When I was about to drop, a clearing opened up, and a set of cracked concrete stairs led toward the imposing gun emplacement. We were on the ridge where the growth was low and reasonably dry. Walls of solid concrete extended a few feet above the ridge, and the fortress itself was excavated to eight or ten feet below ground level. A stairway descended down even further to a chamber where Brad had placed the land station.

While he made the final run, I watched the ever changing light of the rising sun over Pago Pago. A large freighter nosed into the harbor, the DWYN WEN rocked sleepily at her mooring, the streets were quiet, the town still slept. The misty rain clouds hovered over the peaks across the bay; the fleeting sun pecked through, covering the deep jade green vegetation with iridescent sparkling gems. From the narrow ridge, which continued up and up and up and disappeared into the clouds, I could look directly down onto the town square on one side and into the High School yard on the other.

As soon as Brad completed the run we packed the heavy equipment and started down the mountain. In one hand I carried the plastic bucket containing the storage batteries, with the other I grabbed onto anything that might help to break my fall or stop my slide after falling. It was only now in full daylight that I realized that the open spaces which looked so welcoming on the way up were a part of the pig runs covering the whole mountainside! As we neared the houses the path appeared and at last I could stand upright. Relaxed, I took three steps, my feet went flying out from

under me. I slipped and slid trying to keep the bucket in an upright position. There was laughter, but I couldn't see anyone. And then Brad came tumbling down on top of me, land station and all. Gales of laughter this time! As the crew told me later, Polynesians consider sex and accidents as the main sources of humor. Brad and I got up laughing ourselves and waved to our unseen audience, and continued on our way in spite of the fact that every bone and muscle in my body was aching. It was many days before the last black and blue spots disappeared.

This was our last day on Tuituila. I visited the outdoor market to select fresh fruits and vegetables. Jack and Royd drove out to the hospital to pick up the laundry, to the bakery for bread and eggs, to Hallacks to pick up a radio part. I shopped for souvenirs, pareo cloth, shell leis, baskets for the scientists who had not had a chance to browse the shops. Brad had final cables and telephone calls to make to the laboratory and asked me to come along. The first call went through. Brad handed me the phone. It was Bari! He had arranged this the day we arrived in Pago Pago. She was well, bubbling, excited. A voice conveys reality that is lost in words on a written page. Happily we paid the seventy dollar toll charge.

Brad continued with technical matters, clearing with officials, ordering equipment to be shipped to Auckland for the New Zealand operation, arranging for our taped data to be sent to the laboratory, and checking our papers, because our next stop would be a foreign one. I made a final mail call at the post office and at Burns Philps, the Scripps overseas agent whose office is located in the building that was the hotel in Somerset Maugham's story "Rain." We all had letters to read while at sea, but we didn't want to go without making a last check. There was nothing more for any of us. Even George's girl friend had timed her letters correctly.

The DWYN WEN powered over to the dock for refueling for the long trip to Auckland, where we would meet winter and heavy seas in the southern hemisphere. The water tanks and casks were drained and cleaned and filled. Each scientist, every crew member and I were intent on getting our chores done before 4 p.m. when Wally Jennings was scheduled to arrive with his bus to take us to the dancing at Vailoatai.

Fuel was still being pumped when Wally arrived at 5 o'clock. Big Jim loaded the bus with a 150 lb tuna that he had bamboozled from one of the fishermen. Jack and Wally picked up several cases of Hinano as a gift for the Chief. We left the jeep for Stan and Jerry, and the rest of us boarded the bus for the drive to the village.

Enroute we picked up a few Samoans who wanted to go to the dancing. They brought guitars and ukuleles. We stopped every few miles to pick up additional Samoans going in our general direction and dropped them off when we passed their villages. Wally made one stop to inquire about a sick child, another for a passenger

to drop packages off at home. At every store or settlement, we stopped for the latest news and passed on the news from the previous village. Needless to say we were a bit late.

The dancing was in full swing when we arrived. The 'old ladies' were beating on drums, the women and girls rhythmically swaying and telling a story with their hands. The honored guests were seated on mats in front of the Women's Health Committee fale. Walter and Judy had the place of honor next to Chief Satele and his wife. The Chief formally made places for us next to them. Silau handed us chilled bottles of Hinano.

The dancing was stylized, impressive and beautiful. The young girls with their flowing hair, adolescent bodies and colorful costumes were magnificent to watch, but their grace of movement and the precision of their steps could not be compared with that of the women who had been dancing for many years. Dancing is a part of the Samoan way of life. The little girls were mimicking their older sisters and mothers in groups around the outside of the dancing circle. The soloist in the final dance was Fonga, the village virgin. She did the Samoan Sword dance wearing a costume of material woven from the finest straw that clung to her body and fell in soft folds like silk. The sword caught the light from the low angled sun and glistened as she went through the intricate patterns of the dance.

The party moved into the fale where formal speeches were made and answered and gifts given and received. The DWYN WEN was given three lovely tapa cloths and two shell leis. I asked the chairman of the Women's Health Committee if it would be possible to buy additional tapas so that we would have one for each member of our shipboard family. She spoke to the villagers in Samoan and soon one by one various women left the fale and returned with treasured tapas that they had hidden away in their own homes. Chief Satele was surprised since there were many that he had never seen before, and the Chief is supposedly the owner of everything in the village. It is a serious offense to hide anything from him. Chief Satele smiled, and said that he could not beat all of his women; besides, the sale was for a good purpose, and the money would go to the Women's Health Committee. The bargaining went on for some time because each negotiation had to be completely translated and reported to the assembled group for approval. The crew was a bit upset for they had not heard my discussion with the committee chairman. They tried to bid on the tapas too, but every tapa that left Vailoatai went with me.

As soon as the trading was completed, the informal dancing started. Lyric singing accompanied by guitars started softly in the background, and the seated women began to sway on their mats. As the music picked up in speed and rhythm they arose and danced in a circle. As the music got faster and faster, first one crew

member then another was called into the circle. There was great shouting and laughter as the boys taught the women the American twist. On the Chief's recommendation, Brad gave dollar bills to the 'old ladies' who had been instrumental in preparing the celebration. Honorary Chief Walter Munk and Mrs. Satele performed a concluding dance. Then the skipper and Royd started to do a sailor's hornpipe, but there was sudden silence from the assembled Samoans. The Chief explained that after a Chief dances, the party is over and no one else dances, but since we were palangi and did not know their customs, he would give permission to Stan and Royd to continue. He repeated the conversation in Samoan, and the dance was hilariously enjoyed by all.

We had had a wonderful time at Vailoatai, in a beautiful village with warm and friendly people. We found the afternoon and evening enchanting. However, to other people who had spent some time in Samoa, the day was disappointing. I again refer to Judy's diary:

"The dancing certainly didn't turn out as we had all hoped. The plan was that all the ship would come. We had stocked up on beer; the crew was bringing a huge tuna from the Japanese fishing boat which all of us were to eat raw with soy sauce, etc. By 4:30 the photographer and Walter were restless to begin while the light was still good. Mrs. Satele was getting Fonga dressed, borrowing safety pins, etc. Fonga is the Village Virgin and the central figure in the ladies dances.

"Anyway at five we walked to the center ceremonial fale and were seated on a mat. Everyone seemed completely disorganized. The Chief arrived by bus after the dancing had begun. So did the Bradners and part of the crew. At this point we saw the tuna, first arriving at our fale and then because it really looked so terrific, Jim and Silau carried it slung on a large pole down to the festivities. This was the last anyone of our party saw of it. By OLD SAMOAN CUSTOM, any tuna brought to the middle is at once divided up among the ladies of the village. However, no one at this point was aware of Old Samoan Custom. Rain and darkness soon scurried everyone under cover and the party moved inside. The the Chief tried to send the beer back to our fale, another OLD SAMOAN CUSTOM, Chiefs are not supposed to drink beer at official ladies dancing parties. Now there was about fifteen minutes of gayety. The ladies dancing and good laughing. Mrs. Satele had kidnapped Walter and dressed him in blue velvet and tapa. Several speeches were now made. Brad got up to make a speech. He stood. OLD SAMOAN CUSTOM, you should never stand in a fale. Then the ladies brought mats and tapas to sell to the Bradners who had asked the Chief about crafts.

"Walter's dance with Mrs. Satele was announced by the Chief. Walter kicked up his heels and carried on beautifully while the dancing ladies whooped and



hollered and literally climbed the posts and rolled ecstatically on the floor. The Chief looked pleased, but only for an instant. As soon as Walter stopped Capt. Rayner got up and did a lively sailor's dance - huge faux pas. When Mrs. Satele dances, it is the last dance of the party and no one - but no one - is allowed to perform afterwards OLD SAMOAN CUSTOM.

"The party disintegrated. Walter was sure that OLD SAMOAN CUSTOM never turned feast into market place, and besides that, where the deuce was the fish. We were all starving! We walked out, home in the rain, heard about the fate of the fish and decided to leave the children with Fonga and get something to eat in town. Everyone was milling around in the dark and Walter was fit to be tied, and thoroughly mortified that guests were leaving a feast hungry.

"Well, as we piled into the jeep for town and escape, Edie and Kendall set up such a hysterical 'don't leave us' that it seemed useless, so Walter and I stayed home. He, fuming, put the girls to bed and waited to see what on earth would happen next.

"The Chief came to our fale. We had coffee. Two hours later communications had been re-established.

"The moral of the story, I guess, is next time we better establish OLD SAMOAN CUSTOM before and not let palangi version of South Sea hospitality take its course."

Our return trip on the bus was long. The Hinano had had its effect, every few miles we had to stop. Soon we ran out of Hinano; we had to stop at another store to buy more. Someone sat on Jerry's guitar and completely collapsed it. We were not heartbroken, because we had become a little tired of the three Tahitian tunes that Jerry played continuously. A dance was in full swing at the High School auditorium, and no one really wanted to go out to dinner. So we stopped again and danced for about an hour. Doing a Samoan twist with a large sweaty lava lava clad native was quite an experience, especially since I can't do the American twist very well.

We returned to the ship in the early morning hours and decided to wait until daylight to leave the harbor. We had lost Bob someplace, but he had made his way to town and had gone to sleep in the shore boat, knowing that if he stayed there he would not be left behind.

The throb of the engines awaked me. It took a few moments to realize that we were underway and headed for our next adventure. I dressed quickly and went topside. In the early dawn we approached the sea from the entrance of the harbor. We were once again at home on our ship. We passed the entrance islands, the lighthouse, the airport, and the point of land on which Vailoatai was situated. We

stood at the rail and talked of the night before. As we turned southward, we let go with two blasts of the ship's horn to say "talofa."

## **CHAPTER VIII PREPARING FOR WINTER**

Our shipboard home was a shambles. We had all piled into bed the night before without making anything ship shape. I had to climb over a huge roll of Vailoatai tapas on the floor of our cabin to reach my bunk. I couldn't even open the drawer under my bunk for clean clothes. The laundry from the Pago Pago hospital was heaped on top of the equipment in the electronics cabin.

My first job was to sort and stow the laundry to make work space for the scientists. Several of our towels were missing and in their place we found towels marked - Tuberculosis Ward American Hospital Samoa. I found unrecognizable shirts and shorts, but couldn't find much of our familiar wearing apparel. A couple of dresses, not even the right size, replaced some of my things. However, we did have enough clean sheets, towels, and clothes to last until we reached Auckland.

Next I went to work on our cabin. The bundle of tapas on the floor had to be removed first. My problem was to make a fair distribution among the crew. Each tapa was different. They were large or small; square, rectangular, or round; stenciled or free-hand design; straight or scalloped edges. Our usually curious and inquisitive crew ignored me while I unrolled and looked at each one; they were still irked that I had arranged a monopoly. Brad helped me number each item from one to twelve. Corresponding number were placed in a bowl on the table with a note, "Pick a number and match it with a tapa." It didn't take long for the word of the tapa lottery to pass through the ship. In a very short time my cabin was cleared, and I returned to the good graces of the crew.

Shipboard routines resumed: regular meals, instrument assembly in familiar surroundings, scheduled watches, and restful sleep as the ship rode the crest of a wave or dropped into a trough. However, conditions were changing. We were settling in for our longest overseas voyage, Pago Pago to Auckland, and we were approaching winter in the southern hemisphere. It was getting colder. Bathing suits were still the dress of the day, but we wore sweat shirts or sweaters in the mornings and evenings.

The seas rose. Brad appeared at meals occasionally, but slept through most of the first couple of days. Forrest rarely appeared even for meals. It was more than the lack of sleep that kept them in their bunks. Even the best sailor was most comfortable in a prone position.

The seas continued to rise. Flushed and warm faces of two of the crew members indicated something more than seasickness. I sent them to bed with temperatures of over 100°. A scratch on Big Jim's hand festered and sent off angry

red lines toward his shoulder. George could hardly swallow and the glands on his neck were swollen. No one on board was trained or even semi-trained in first aid. We did have the Merck Manual, a medical dictionary, and an adequate first aid kit. I started reading, studying, translating symptoms to a medical diagnosis, prescribed treatment, and began nursing a sick crew: alternate hot and cold compresses for the infection; aspirin, antibiotics and fruit juices for the temperatures and sore throat; bed rest for all patients.

We were short-handed. I headed topside to relieve the man on watch when a heavy swell heeled the ship over into a sudden violent lurch. I fell striking my knee against the sharp corner of the sextant case. The pain was intense but nothing was damaged or broken so I hobbled from skylight to skylight making my way to the wheel.

I was relieved late afternoon and headed for my next job, that of galley slave. Serving and clearing became a time consuming processes; I had to grasp the guide rope in the salon, or the companion way railing, or the sink at all times. It was almost impossible to manage even a few steps without some solid support. I let go of the sink for a moment and an enormous pitch came. Instantly I was thrown completely across the galley hitting the wooden bars on the opposite bulkhead. The breath was knocked out of me and I collapsed to the floor. Royd secured the boiling pots on the stove, hung onto the counter railing with one hand and came to my rescue. He felt sure that I must have been injured or perhaps even broken my back. But I discovered I could still move. Braced between the two galley walls, I declared that I had to get up and go back to work. Dinner was ready to be served, patients needed attention, and I was still one of the few people on board not stricken with some malady.

Everyone who was able to eat gathered around the gimbaled table. The angle of tipping was the greatest we had witnessed. Many times one edge of the table would reach its minimum just inches from the floor. We were careful with our knees, keeping them away from the table, fearful that we might send the food flying if we slowed down the tipping process for only an instant. Royd let go of the guide line to place a platter of sliced roast beef on the table. A wave hit! Royd went flying, but he gently placed the platter on the table before he hit the deck. With the next roll he slid across the deck, under the table, and came to rest against the leaded gimbals!

Down came the roast, the gravy, water, milk, mashed potatoes, pickles, peas, and a large jar of coarse ground pepper. With each roll he slid back and forth with mashed potatoes in his beard, sliced roast on his shoulders, pepper and gravy over all, to the accompaniment of roars of laughter from everyone. Brad had grabbed the cup cakes as the table went, and coffee was still in the galley, so we did finish the

meal properly. The salon was a mess! We brought in the garbage can and started pitching everything into it. We used a dust pan to scrape up as much as possible, but were not able to get the peas and pepper from behind the lashed equipment cases until we arrived in Auckland.

The seas remained heavy but the wind steadied so we hoisted the sails. This made for a much smoother ride. The crew recovered, regular watches resumed, measurements progressed, and I settled down to continue Bari's letter. I felt a little moisture and heard a flapping noise. We were in good fishing waters and Big Jim was lowering his prize catch of the day, a yellow tailed tuna, down through the skylight for my approval before seeking help in planning the dinner menu.

The Tongan Islands, which cover a wide area in the South Pacific, lay just ahead of us. We had all applied for Tongan visas as a precautionary measure, but unfortunately Tonga was not on our schedule. The crew wanted to stop. I wanted to stop. Brad was anxious to get on to New Zealand and the operations there without delay. We scanned the horizon for a glimpse of the Tongas before settling in for winter.

Brad was aft reading a book near the helm. A couple of the crew passed the time talking with the captain.

“What's the weather apt to be between here and New Zealand?”

“We're getting farther south all the time and will probably hit some of the southern storms before we reach Auckland, but it shouldn't be bad.”

“How much of the time will we have to power?”

“Can't tell. Depends on the wind and swells and whether or not we have a following sea.”

“How's the fuel supply? We used quite a bit in the heavy seas out of Pago Pago.”

“Several days supply left, with average winds and moderate weather, there's no problem. We should have enough. It's reasonably calm now so how about transferring oil from the barrels into the tanks.” The crew got out the pumps and hoses and started to work.

Brad continued his reading which, unknown to any of us, was on the geology of Tongatabu. Stan kept his eyes on the compass and sails. The cooks were making pineapple upside down cup cakes for dinner. I was transcribing some notes. Bob studied charts of the sea floor and with his slide rule made calculations of when we would be arriving at the next drop spot. Forrest was in his bunk.....he is really NOT a sailor!

The watch changed. Stan made entries in the ship's log. Brad joined Stan in the chart House.

The next thing I knew Big Jim came tumbling down the companion way, stumbling over his feet. "We're on our way to Tongatabu!"

It seemed that after careful calculations we would have enough fuel to get us all the way to Auckland, but in case of unusual heavy seas, we might be stranded helplessly in southern storms. In addition, the limestone caves on Tongatabu would make an excellent spot for a land station measurement. Also, Brad was anxious to send one person ahead by air to do the preliminary set up for the New Zealand operations.

An ocean drop was negotiated without incident. The land station was made ready. I typed up the necessary entry papers, reports on passports and visas for the authorities at Nukaloafa.....this is when I learned that, next to Brad, I was the oldest person on board the DWYN WEN!

The first island of the Tonga group came into view during the morning. Steep volcanic mountains pierced the overhanging clouds. On this island there are no harbors; supplies must be ferried in small boats; mail is thrown over in a tin can and a Tongan swims out to recover it. For some time the two activities of the island were raising sheep and cancelling stamps for philatelists. I looked for a swimmer or a tin can or a small boat, but were not destined to be a mail ship.

Soon other Tongan islands lay all around us. Some were precipitous volcanic islands, others low atolls almost awash. Ahead of us in the distance appeared Tongatabu, our destination. The usual entrance to the lagoon was from the west where the channel was deep and wide. Liners and freighters are able to negotiate this channel easily. The channel from the north is long, narrow, and treacherous with sharp angles and poorly marked buoys; but we would need to take an additional day to make our way around the island and enter by the main channel. We contacted the Nukaloafa harbor master on the radio to get his advice, hoping that it would be possible to enter from the north, because we feared that with a twenty four hour delay, Brad might change his mind. The harbor master said the channel was navigable just at flood tide, and gave us the latest information on the channel markers.

Stan ordered two men on the masts to watch for shoaling water and channel direction change. The rest of us were stationed at various points on the ship to watch for green water. Stan lined up marker buoys with the binoculars. We made it through the channel safely. The Nukaloafa harbor was large, flat and calm. The small reef islands behind us enclosed the north side of the harbor; the main channel entrance was wide and looked to the open sea.

## **CHAPTER IX**

### **DIVIDEND – Tonga**

We stepped from the ship to a shaky plank wharf, where a toothless Tongan woman placed a shell lei around my neck. Ahead of us on one side was the market place, buzzing with flies but otherwise inactive in the late afternoon. On the other side a boxing match was in progress in a large recreation hall. Each person in the audience seemed to be rooting noisily for his favorite, or loudly discussing something with his nearest neighbor or with some fellow on the other side of the ring. At the head of the wharf stood the post office, closed now, so we would have to wait until tomorrow to mail the letters and post cards that we had been writing feverishly ever since we'd heard that we would be stopping at Tonga. The outdoor stalls displaying native handicrafts were closing, because the large New Zealand freighter with tourists had just departed. We saw many of the crafts of the island: large woven baskets, varicolored shell leis, tapas, fans, and an unusual assortment of very large sea shells.

Two Tongan women approached and indicated that they wanted to guide us around the town. They pointed out the two recreation spots: the Tonga Club and the Nukualofa Club. They did not mention or point out the Yacht Club that the British Harbor Master had told us was the only place to go in Nukualofa, the only place restricted to persons of European descent. We already had ruled out the Yacht Club as our headquarters ashore because our objective, as always, was to meet the native people. We walked down the main street, passing at each intersection little red and white striped kiosks for the policemen directing traffic. Cars were rare. Traffic was mainly bicycle and pedestrians.

The well-kept parts of the town bespoke the industriousness of the people and their pride in their homes. The frame houses were separated by large native grass lawns facing on wide clean streets. Flowering trees framed rows of neat vegetable and flower gardens. For the first time in Polynesia I saw beautifully kept rose gardens.

Our guides took us into many of the shops along the main street. The shelves contained only essential unimaginative items: a few cooking utensils, yard goods of dull colors, needles and thread, drab shirts and trousers. We found no souvenir or tourist items in any of the stores. We learned that the craft markets are set up only for the day, at the park by the main wharf, when a ship is in port.

By five o'clock we had completed our tour of the town. A cold breeze urged me to put on a light sweater. We had left the warm evenings of the equatorial tropics. The chill in the air reminded Jack and Royd of the turkey roast they had put

in the oven just before leaving the ship. It should be about ready to feed our ever hungry crew. We tried to take leave of our guides, but they rushed us across the street to a waiting taxi. Again we tried to break away from their clutches and make a rapid sprint toward the ship, but they cried, "You come, you no pay, Tonga family," and shoved us into the taxi. It took off at breakneck speed. The driver chattered at a rapid rate, yelling to friends along the street and sounding the horn continuously, and made a sharp left turn on two wheels.

We proceeded up a side street a mile or more out of town before he came to a sudden halt at an alley. I saw a weathered wooden house and several people gathered outside around a shack, where a steaming pot hung over a roaring fire. Two women hurried toward us. One was a mother with a very small baby balanced on her hip, the other an attractive teen-ager in a sweater and skirt. The girl, Fainga, spoke English. She introduced us to the rest of the family - mother, father, younger children, grandmother and grandfather - and invited us inside, where I was seated on an overstuffed arm chair. The boys were ushered to a wooden bench.

Fainga acted as interpreter. The family had a plantation on the outskirts of Nukualofa where they raised fruits and vegetables which they brought daily to the market place on the wharf. We told them of our needs for the next leg of our voyage and they promised to set aside fresh produce for us the following day. Fainga had learned her English in Fiji where she had attended high school. She was returning to Fiji in a few days in hopes of getting a visa for the United States, where friends had arranged a home and a tuition scholarship in a hairdressing school. Her mother invited us to dinner. Royd immediately answered, "Thank you, but we are the cooks on the ship and must return to feed the crew." He was not really too concerned about feeding the crew, but he did remember the chicken head at Swains.

When we took our leave I was presented with a woven fan trimmed with brightly colored chicken feathers, and the boys with large tiger cowry shells. We hoped that our two guides would accept the dinner invitation and let us return to the ship alone. We declined to take a taxi, hoping that would discourage them. But no. They stayed at our elbows. Their behavior became more attentive, alternately bold and coy. One woman decided that Jack was her man; the other had her eyes on Royd. The boys kept close to me as the eager coquettish females ogled them. If they had been even moderately young and attractive, I'm sure I would have found myself along in Nukualofa.

By the time we got back to the center of town it was dark. As we passed the Tonga Club, Royd suggested a beer before going back on board. Maybe we could unload our guides there by ducking out while they were drinking. To our surprise, they refused to go in the club, so we waved goodbye and mounted the steps to the



verandah. Several of the crew were inside and we reported on our afternoon's activities. The native manager approached with a register and by gesture and a few words, translated by an Englishman at the bar, informed us that women were not allowed to enter the inner sanctum. However, he indicated that it was all right for me to sit on the verandah, and that my friends could join me if they really wanted to drink with a woman. I suddenly realized that I was different, that there were no other women around, and that I was an interloper in this Tongan club. I went outside. One by one each crew member pulled up a chair and eventually even the Englishman joined us.

The crew had a busy afternoon. Their trading treasures were piled in the corner. They had baskets, shells, leis, tapas, and mats. They had also gotten acquainted with people around town. One was going to a church social, another to a Tongan home for dinner, and George was last seen arm in arm with the most beautiful teen-age Tongan in Nukualofa. Stan had made contact with several craftsmen and was negotiating for their wares. One of his dreams was to set up the DWYN WEN as a trading schooner in the South Pacific. On every island and in every village he was contacting local artisans and telling them of his dreams and enlisting their aid. Stan said that Tongan baskets and tapas would be important trading items everywhere in the South Pacific. He had seen some fine pieces, including a tapa almost a hundred feet long. I immediately did some quick calculations: any statement by a sailor should be divided by two and the answer still considered an exaggeration. Still, after applying this formula to Stan's statement, I realized that the tapa must be enormous.

Beer did not satisfy our hunger pangs so Jack, Royd, and I took off for the ship. The others seemed content and ordered another round when we took off. Our two guides were waiting at the gate to escort us home. As the boys jumped from the dock to the deck, one of the belles called me aside.....

“You find me friend on ship? No?”

The ship was almost deserted. Brad and two policemen were the only persons on board. Jack and Royd stayed only long enough to grab their trading items and return to town. Brad had spent the afternoon paying his respects to the secretary of the government, sending messages and reports through the shipping broker, getting the necessary permission for the land station operation from the officials, and was now putting the finishing touches on the equipment for the morning run.

The authorities had assigned the two policemen to the ship as watchmen. Since this relieved the watch from staying on board, they were our welcome guests, and when one came below I asked if he would like something to eat. He followed me to the galley, barely able to squeeze his six foot six, three-hundred-pound frame

through the door and watched while I made him a sandwich. He indicated that he wanted the other piece of meat, not the slice I had just cut. He left the galley with a quarter of a turkey roast between two slices of bread.

The galley was a shambles and I realized why the the crew had not appeared hungry and why Jack and Royd had made such a rapid retreat. Before going to the Tonga Club, the crew had raided the ice box, the freezer, the oven, the canned goods, and left the debris strewn about. I cleared a corner of the table and gathered up a few remains for Brad's and my supper. There were no restaurants in town and it was too late to return to Fainga's home to accept the dinner invitation. We tidied up a bit and then we, too, headed for town.

The recreation hall at the side of the wharf had been transformed into a dancing pavilion; the European colony was holding a formal cocktail party at the Yacht club; Tongans and Europeans alike were whooping it up at the Tonga Club; the church social was in full swing. A handsome young Tongan presented me with a lei made of tiny pink tea roses. Late in the evening we stopped at the Nukualofa Club across the street from the Palace. There were girlish giggles from behind the high hedge that completely surrounded the lawn and building when we entered; the giggles turned to laughter when we left a few minutes later. The Nukualofa Club doesn't even have a verandah!

Early next morning Brad outlined the scientific schedule and Stan the ship's schedule: land measurements in the limestone caves, refueling at the dock. Brad was becoming concerned about the operational schedules and the arrival of equipment in New Zealand. It seemed desirable that someone go ahead to Wellington and complete detailed arrangements for the TARANUI, the large research vessel that the New Zealand government was making available for our experiments. Deep ocean drops from the DWYN WEN were essentially over. Not only would the weather be heavy from here on, but also we would be crossing the Tonga trench, far too deep for our spheres.

“Forrest, how would you like to fly ahead to Wellington?”

You could see the wheels spinning in Forrest's mind: first a look of disbelief and unreality; then the look of relief as he realized he wouldn't have to spend another day on that miserable ship; finally the practical aspects, how could he represent the University of California in a foreign country? I could sense his concern. He was stripped down to cut off GI fatigues and a flapping pair of sandals; his beard was long and unkempt; he hadn't seen a barber for over three months. He hadn't brought a suit but he did, however, have a pair of shoes. We finally located a pair of socks; someone produced a clean shirt of the approximate size; and an adequate pair of trousers turned up among the trading supplies. After an hour long

effort with scissors and razor, Forrest looked barely respectable enough to board the weekly plane for New Zealand. His portfolio carried introductions, a long list of equipment to check, and schedules to arrange. But his first order of business was to get a professional hair cut and to buy a suit of clothes.

I gathered up the mail, took orders from the crew for personal supplies, and headed up town. As soon as I saw the bulletin board at the post office, I forgot everything else. Mounted in a display case was a complete set of the gold coin stamps of Tonga. I remembered what I had read about these stamps some time before.

“On April 22, 1963 the Southwest Pacific Kingdom of Tonga placed into circulation, at the treasury in Nukualofa, the capital, the first coins ever produced by the Friendly Islands. Executed in Gold by the Royal Mint, in London, the coins were the first Gold pieces to form an integral part of any nation’s currency since the world-wide demonetization of gold thirty years ago. They proved an instantaneous international success and the quantities offered for sale through the Crown Agents were over-subscribed in a deluge of orders without precedent in the history of the Bureau.

“To commemorate these coins, so important in the economic history of the Islands, the Kingdom of Tonga has for the last year spared no effort or cost in the preparation of an extraordinary series of postage stamps. Conceived by Ida West, American interior designer, and printed in England, the stamps are remarkable, actual-size, embossed replicas of the real coins, obverses and reverses, on laminated gold foil. There are thirteen values in all - six regular postage and six airmail for public use. One official airmail for exclusive governmental franking.

“Several philatelic ‘firsts’ have been created in the production of these stamps.

1. They are by far the most expensive postage stamps ever made.
2. They are the first true postage stamps amongst the 185,000 odd varieties issued since 1840 to the present, which are circular in shape. Printed singly and die-cut, no multiple pieces can exist.
3. They are the heaviest stamps ever made.
4. All thirteen values, postage and airmail, are printed for the first time on gold foil. To ensure adequate adhesion for postal usage, a special tropical gum has been employed. The unusual surface of the stamps, impervious to ordinary cancelling inks, has necessitated the making of a special cancellation die and ink which will be utilised by the Tongan Post Office Department. “THE DIES FOR ALL VALUES OF THESE STAMPS HAVE BEEN DESTROYED. NO FURTHER QUANTITIES CAN

EVER BE MADE AGAIN AND NO MULTIPLES OF ANY OF THE THIRTEEN VALUES EXIST.”

These stamps are magnificent! Several denominations were already gone. I placed gold coin Tongan stamps on all the letters and cards I was mailing. I wanted to buy as complete a set as possible for Bari’s collection, but the postmaster was hesitant about selling any that were not used on letters. These stamps obviously would become great collector’s items. I had to convince the postmaster that I wanted a set for my daughter’s collection, that I was not a promoter planning on taking them to the nearest port to sell at a profit. I only hope that the recipients of the hundred letters and cards I mailed that morning appreciated the gold coin stamps of Tonga.

Royd and Jack had completed their early morning chores and were putting trading items in a knap-sack when I returned on board. I loaded my camera and grabbed a jacket because rain threatened. Again we were off.

Our two guides from the night before were nowhere to be seen. We heaved a sigh of relief, but by the we reached the end of the wharf we had acquired another equally tenacious guide. This one was a male who had a cousin with a taxi. “You want taxi? Cousin drive. Blow hole, singing foxes, everything. Only \$15. Good price.”

“Thank you, but we want to walk.” He continued to follow us. We asked about buses, since our dwindling finances would not permit a taxi.

“No buses.”

“What about the one across the street?”

“No good. Go plantation. Workers. Taxi, see island.”

We firmly said goodbye and turned down a side street.

The island is small but too large to be covered on foot. We walked past the Royal Cemetery and were nearing the outskirts of town when a truck passed. Why not hitch-hike? We could go just as far as anyone would take us and then walk back. A bread truck stopped and picked us up. We explained to the driver that we would like to ride with him as far as he was going. He nodded. He delivered bread at two or three places, recrossing the same intersection before we suddenly realized that we were headed back toward town. In unison we said, “Stop, we’ll get out here!”

“No. Cousin, taxi.” We crossed the main street, passed the striped kiosk, to a house on the water-front within sight of the DWYN WEN. The driver’s family and friends came to shake hands and greet us. He spoke to them. The only word we recognized was ‘taxi.’ Soon two taxis were lined up in front of us. “Which one you want?” Each driver was rubbing and polishing his taxi until it glistened. We explained as best we could that we didn’t have much money and we couldn’t afford a taxi for the day.

“Taxi no much money.”

“How much?”

The whole community discussed it among themselves. Our driver, the entrepreneur of this transaction, pointed in the two opposite directions that the road took out of town and said, “Singing foxes,” and “Haamunga.” We knew that these two spots were the ends of the road in either direction. This would give us a complete tour of the island.

Again, “How much?”

“Four dollars?”

We could hardly believe our ears. This was by far the greatest bargain in all of Polynesia. We climbed in the nearest taxi and took off. The policeman at the corner smiled and waved as we passed him for the fifth time that morning. We settled back and started on our sightseeing tour of Tongatabu.

A single road leads from one end of the atoll to the other. The capital city, Nukualofa, is situated at about mid-point. We took off in a southerly direction and passed well-kept plantations. The land was well used, the fields healthy and prosperous; evenly spaced coconut palms were interspersed with banana trees and lower growing taro and cabbage. The island is so narrow that in places we could see surf breaking on the ocean reefs on one side and the calm lagoon on the other.

The village houses gave evidence that we were in a cooler climate. The woven walls were not open like those on Swains or Samoa, but solidly constructed as an integral part of the building, which often had an attached cook house. Tapas served as curtains as well as doors. From the largest structure in every village, the tapa shed, we heard the steady beat, beat, beat of a wooden mallet, pounding bark into long paper thin strips.

The kingdom of Tonga is one of the oldest in the world. Her Majesty Queen Salote is the head of a dynasty going back in an unbroken line to the tenth century. The kingdom, an independent state, is associated with Great Britain through a series of Treaties of Friendship.

“Under the dynamic progressive leadership of its Premier, His Royal Highness Prince Tungi, eldest son of Her Majesty and Heir to the Throne, Tonga has made important economic advances since the war. Copra, bananas and other tropical and semi-tropical produce are the main exports. The enormous fishing potentialities are being developed and an intensive program to attract tourists to this island paradise has begun.”

Each male Tongan is given 8 1/4 acres of farmland plus sufficient town land to build a home when he reaches the age of sixteen. It was apparent as we passed

villages, farms and plantations that the Tongans take pride in their country, pride in their industriousness, pride in their future.

As we rounded a curve we saw an unbelievably large tapa cloth stretched out on the grass. Our mouths fell open, seconds passed before we came to our senses and asked the driver to stop, finally able to communicate our wishes. He backed up to where the tapa was laid out. For once the crew had not exaggerated; the tapas of Tonga are immense!



**We saw an unbelievably large tapa cloth stretched out on the grass.**

It was beautiful. It must have been painted by many different artists; the designs changed six times over its eighty foot length. We admired it, photographed it, and smiled and shook hands with all of the villagers. We tried to find out if it was for sale. This was difficult, since none of them spoke a word of English, French, German or Yiddish. A broad smile from the owner implied that she understood. She left and returned immediately with a large pair of scissors, indicated different lengths and waved the scissors around until we realized she was asking us how large a piece we wanted. We pulled her away, saying, “No, no....no cut!” By throwing our

arms out full length and looking from one end of the tapa to the other, we hoped to indicate that we wanted to buy the whole thing. She just laughed.

Royd, the experienced South Sea trader, tried another approach. He took my wallet. Out came all of the bills which he gave to the Tongan woman with great ceremony. Next he rummaged through my bag and pulled out an orlon sweater, from his own he produced a pair of trousers and a red flannel nightgown, Jack's bag yielded a couple of shirts. All of this time I was giving the children candy and chewing gum from my pockets. The owner, clutching the dollars and trading treasures, smiled broadly and spoke a few words to the assembled group who folded the tapa carefully and placed it in the trunk of our car.

I was so excited I could hardly move, but I did want to take some Polaroid pictures to leave with the village. I was half-way through the first picture when Royd came up in a hurry. "Let's get out of here fast!"

"What's up?"

"Her husband has appeared, and he's mad!"

The woman was terrified. She came to me with the bills in one hand, our trading items in the other. She kept pressing them on me and trying to get the tapa out of the car trunk.

My immediate reaction was that we had concluded a transaction and the tapa was mine. But then I looked into her eyes and realized that, for the sake of family and international relations, the tapa should stay in the village. We reverently lifted it out and handed it back. The relief in her face told us we had done the right thing.

We drove on, my thoughts now centered on the art of the Tongan people. What was the reason for not selling the tapa? Perhaps not enough money; perhaps dollars did not have the significance of their own money; perhaps there was some sacred or religious meaning to the very large tapas. The night before, one of the crew had tried to buy a large one, but the owner would not sell. Yet, he had been happy to cut it and sell the pieces for less money than the whole would have brought.

We stopped to see and photograph the flying foxes, the Wood of the Bats. In the grove thousands of bats hang downwards all day and during the night fly over the island taking toll of the fruit crops. To the natives the animals are sacred and are never destroyed. The weather had cleared and two men working in the field along side the road came over to join us. We drove them to a home hidden among the trees. Evidently our driver understood our desire for tapa as well as the need of the villagers for the things in our trading bags.

Here for the first time I really got into the spirit of trading. The villagers pretended to look upon our various items with disfavor, and we in turn regarded their tapas without enthusiasm. Royd kept cautioning me, "Don't look anxious."

After about fifteen minutes of haggling, I ended up with the best of the bargain, a well-executed ten foot tapa with a flying fox motif. I could see that the Tongan felt just the opposite, she had several items impossible to purchase in the meagerly supplied shops in town. Trading in Polynesia is a game; you have to know the rules; I was beginning to catch on. Finally I broached the subject of a LARGE tapa. They took us to another house where a tapa too large for any practical purpose, but not large enough to be unique, was displayed. I shook my head and indicated something even larger.

Someone went after a woman who spoke a few words of English. After explaining once again what I wanted, she talked with several other villagers and asked us to follow. We walked across the road to the tapa shed where a large number of cloths were stacked in back. The top two or three were set aside, the next was partially opened in the center of the shed, too large to be fully unfolded. It seemed every bit as large and beautiful as the one that got away. I tried not to act too anxious. "How much?"

After some discussion she quoted a price in Tongan money. I did a quick calculation and offered all the New Zealand pounds that I had tucked away in a corner of my wallet and added a few dollars, which I handed to the woman. Another lengthy discussion began, during which all the village elders examined every bill. The entire village had gathered by this time. I started getting cold feet. Did I really want the tapa? Would I need these pounds when I first arrived in Auckland? What in the world was I going to do with something this size? Royd had an easy answer for the last question.

"No problem, cut it up and use it for gifts. It will keep you in Christmas presents for the next twenty years!"

The suspense was nerve wracking. Finally the interpreter returned with a smile on her face. She gave the money to the village leader who also smiled and presented the tapa to me. This tapa had been a project of the entire village for the previous four months. We shook hands with everyone and they carried it outside to spread full length for folding. Only then did I realize how large and beautiful it was! The overall design and pattern had been applied by a stencil process with a tapa board. The accent designs were painted by different artists using a combination of saps from local trees. Folded, it was too large to fit into the trunk of the car, so for the rest of the day we held it on our laps and did our sightseeing under the weight of more than two thousand square feet of tapa.

"What are you going to tell Brad?" I thought about this and decided that the best place for the Tongan tapa would be in the new Institute of Geophysics and



Planetary Physics at the University in La Jolla. The building was large with rough hewn redwood walls, and a tapa hanging would be most appropriate.

Our driver stopped once to strip a mulberry sapling and show us the raw material of tapa. By pantomime he explained how it was pounded into long pieces and bleached in the sea before the small pieces were glued together to make a larger one. Before designs are applied the material is a soft supple white fabric. Royd packed away the piece of raw mulberry as a 'do it yourself' tapa.

Late that afternoon we made it back to the ship. Our driver, Jack, and Royd were weighted down by the tapa when they climbed on board. "Brad," I said, "I bought a present for IGPP!" He was delighted but did not see it fully until four months later when it arrived at the laboratory.

Brad had just returned to the ship from the airport where he had put Forrest on the plane for New Zealand. The run in the limestone caves had been successful and Bob was resetting the instruments in the electronics cabin. The final hour was busy. Brad sent off reports and cables and stowed the last of the experimental equipment on board. I made a final trip to the post office. Jack and Royd picked up fresh supplies for the last leg of our journey. The crew lashed everything down in anticipation of rough seas ahead.

The town flocked to the wharf to see us off. The young Tongan who had given me the rose lei the night before came on board with gifts of slippers, leis, and colorful shells for all the crew, and I purchased a small special double tapa made by his mother. By 5 p.m. we were ready and cleared by the harbor master. The Tongan police left the ship. We cast off and slipped through the channel, heading for open sea by the time darkness fell.



**Marjorie Bradner on deck of the DWYN WEN.**

## CHAPTER X

### SOUTHERN WINTER

It was a rough night.....heavy swells, heavy rain, continual pitching and rolling. We were approaching the winter zone where storms created the waves that oceanographers were measuring across the great circle from Cape Palliser to Yakatat. Now in the open sea, with nothing between us and the Antarctic thousands of miles to the south, the ship tossed onto wave crests and dropped into troughs as we plowed toward New Zealand.

It grew colder. Shoes and socks replaced go-aheads and bare feet. We shed our bathing suits for trousers and sweaters and sou'westers. My old knee length fur lined ski parka was most welcome.

Life on board changed. We spent leisure hours below reading in our bunks or in the salon, the days of soaking up sun on deck had come to an end. Experimental work ceased; the seas were too high and the ocean too deep. Cabin fever spread. We celebrated Bob's twenty-ninth birthday, in true shipboard fashion, with a dinner composed of all the things Bob did not like. Even the candle bedecked Tongan watermelon was on his list of least favorite fruits.

Although New Zealand lay southwest, Stan insisted on sailing west for a couple of day to give Minerva Reef a wide berth. This graveyard of ships has caused sailors nightmares ever since it was named in 1829 by the survivors of the whaler MINERVA. North and South Minerva Reefs are barely awash during low water; at high tide they are just out of sight below the surface. In days of storm the place is a fury. Many ships have foundered on these isolated reefs, most without survivors. One notable exception was a Tongan cutter whose survivors had just returned to Nukualofa at the time of our visit.

“On the night of 7th July 1962 the twenty-ton cutter TUAIKAEPAU, sailing from Tonga to Auckland, ran hard upon the outer edge of Minerva Reef, 380 miles south of Suva in Fiji. Heavy seas and the sharp teeth of the coral quickly broke the cutter to pieces, and her complement of seventeen Tongans found themselves without even a small boat on a reef that was totally submerged except during the few hours of low tide each day.

“They had neither food nor water; their only shelter was the hulk of a Japanese trawler that had been earlier wrecked on the reef; and some of them had little or no experience of the sea. Yet all but a few of these men survived. They kept themselves alive for one hundred and two days on the reef, and finally encompassed their own rescue.”

We could not help thinking of this treacherous bank somewhere to the south. For days at a time we were unable to get sun sights. Were we drifting toward this graveyard of the Pacific?

“Since the European has invaded the Pacific the list of wrecks, expanding with the years, has included vessels named and identified; but, European or islander, few castaways have survived to tell their tales. While it is true that the typical thunder of such seas is audible at considerable distances, there are times of storm when sight and sound of the reef are lost in the general maelstrom of vibration and darkness; and many and many a mystery of the ocean would be solved if the Minervas uncovered all their secrets.”

The story of the survival of the Tongans on South Minerva is a thrilling present day South Sea saga.

Leisure time on deck became a thing of the past. The walk from the chart house back to the helm was a challenge - not unlike rock climbing: move only one hand or one foot at a time. The right hand leaves the chart house door and grasps the salon hatch cover; the feet move out on deck; the left hand makes a grab for the hatch. Then hand over hand and foot after foot make your way to the wheel where the helmsman is braced between the engine hatch and the binnacle with both hands firmly on the wheel.

When we dropped into a trough the angry seas towered above the stern, and the helmsman was only a silhouette against steel grey water. A trip on deck was for exercise, for variety, a battle against wind and rain. I like to stand at the chart house door. One time the sea suddenly broke over the entire ship, flooding tons of water over the shore boats, washing across the deck and around the spheres, surging into the chart house, and cascading down the companionway into the salon. We secured the door, mopped up, and sailed on.

We approached New Zealand, the Minervas and the Tonga trench now far behind us. Ahead lay the large land mass of North Island. Within a few months summertime yachtsmen from all over the world would delight in cruising through islands, inlets, and bays of the most beautiful sailing waters in the world. In the hazy winter sky we could make out the outlines of the mainland which at this time of year, looked grey, dark, and cold. A strategically located lighthouse welcomed us with its reassuring beams.

To celebrate our first sight of New Zealand, Stan furnished a bottle, Royd and I made hors d'oeuvres, and we had a cocktail party. The food was good, the whiskey smooth, the conversation lively, but our beer drinking crew did not make much of a dent in our fifth of seven-year-old scotch.

Showers on deck were out of the question. No more refreshing and water saving tropical squalls. So I learned the technique of a wonderful bath: heat a bucket of fresh water on the stove; gingerly carry it from the galley, with one hand firmly grasping the guide line, aft to the port head and the shower; wedge the bucket firmly between the head and cabin wall; take a cold salt water shower; rinse first with sea water and then with cup after cup of warm water. I poured it over my hair and body until a sense of comfort, cleanliness, well-being, and thawing came over me. Then I climbed back into dirty jeans and sweatshirt. I felt a great desire for a proper shampoo and haircut, a manicure, make-up and perfume, a dress and jewelry. Even the men resented their grubby beards, shaggy hair, and rough clothes.

We contacted Auckland by radio to get weather conditions and instructions, and to give our estimated arrival time. We inventoried the remaining supplies and food, packed our South Sea treasures and souvenirs for shipment home. I crammed my suitcase for a month in New Zealand and flight home via Fiji and Tahiti, a schedule which included a camping trip, skiing, city luncheons and dinners. My wardrobe of forty-four pounds proved minimal but adequate.

Our last day on board the DWYN WEN dawned clear and cold as we powered into Auckland harbor. A penguin swam and dove alongside the ship. Island bays to our right and left sheltered summer cottages. Tree covered peninsulas jutted into the harbor.

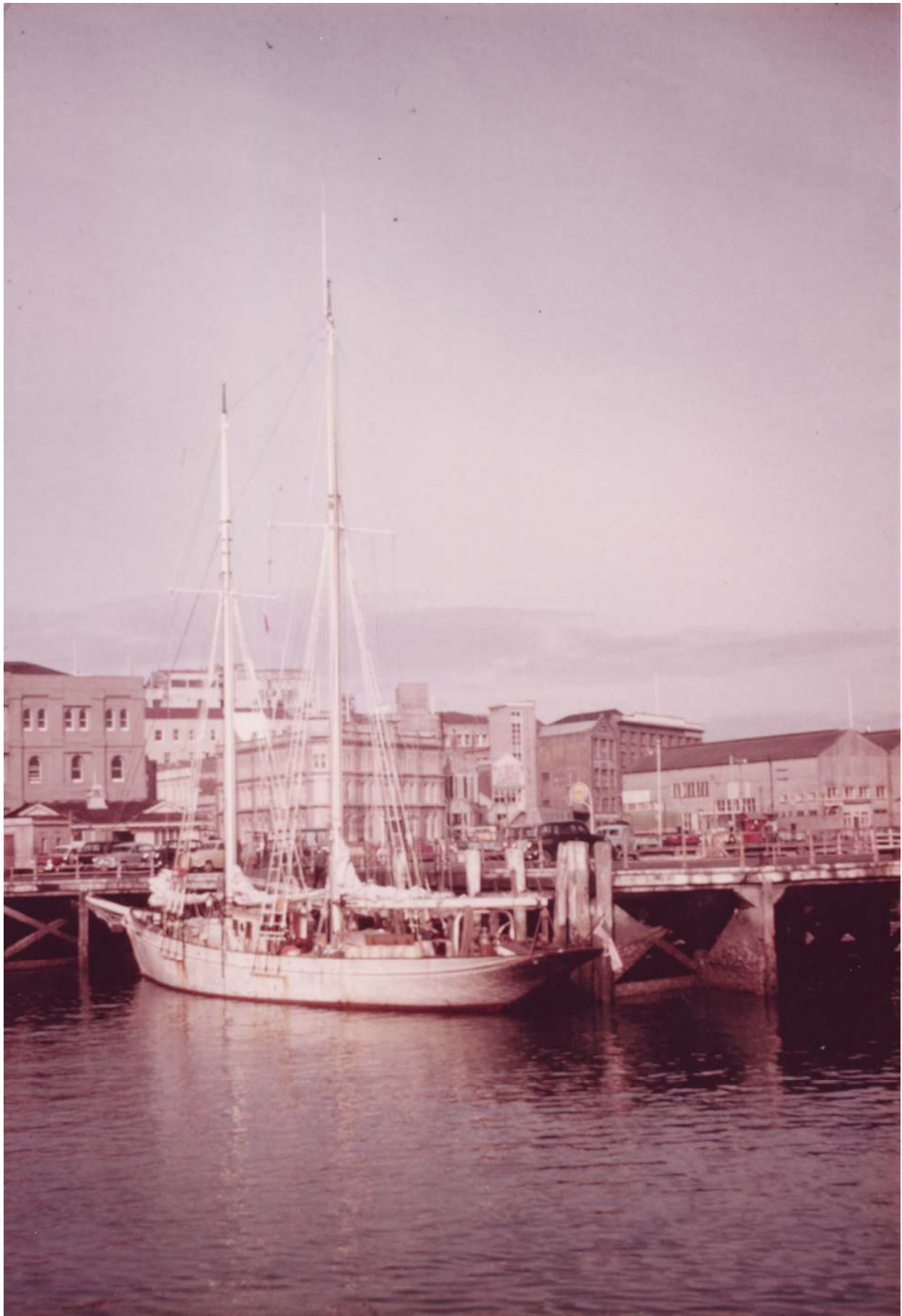
Commuter ferry boats glided to and from the suburbs. Ocean liners and freighters crowded the wharves.

The pilot boat brought the harbor master, medical examiner, and customs officer alongside. While they examined our papers and passports we were guided into Queens wharf. Here was a city whose ferry building and clock tower reminded me of San Francisco. I scanned the waiting throng for Forrest. He should have been notified that we were arriving a day ahead of schedule. One man jumped down onto the deck.....clean shaven, grey flannel trousers, dark blue reefer jacket with a neatly folded linen handkerchief in the pocket and a smile on his face. It was Forrest! Not one of us had recognized him on the dock.

The press came on board. Science is becoming increasingly important in New Zealand, and the report of our seismic studies, in cooperation with the New Zealand Department of Scientific and Industrial Research, was news. So was the arrival of the largest schooner in many years. While reporters interviewed the scientists and skipper, the crew secured ship. I made my way through the dockside crowd with a towel rolled up under my arm and walked two blocks to the Tepid Baths where, for one shilling, I luxuriated under a hot fresh water shower for half an hour! I returned

to the ship ready to face whatever came next. As I entered the salon a young customs officer rose, shook my hand and said.....

“Welcome to New Zealand, the southern outpost of civilization.” At that moment, it seemed the very hub of civilization.



**The DWYN WEN in the Auckland harbor at the end of the voyage.**

## CHAPTER XI BORN LUCKY

New Zealand boasts the greatest wonderland of scenery and sport in the world. For years I had dreamed of visiting it. Here I was.....free to explore. The experimental work would continue for another two weeks: Bob and Forrest on the New Zealand Research Vessel TARANUI; Brad at a land location. For us life on board the DWYN WEN had ended. Jack and Royd were free too. They had signed on the ship only as far as Auckland and would be flying home soon to their students and studies for the opening of the fall semester. Since the three of us had no responsibilities now, we planned a weeklong North Island camping trip.

We bombarded the customs officer with questions. Where should we go? What should we do? Is public transportation satisfactory? Should we rent a car? The customs officer, Robin Greiner, was an enthusiastic salesman for his country. We took notes, sketched routes on a map, and mentally absorbed his glowing comments. Jack had an inspiration.

“How about coming along?”

Robin wanted to, he could take four days, but any request for additional leave would take time. He held no hope of obtaining permission soon enough. We invited him to have dinner with us on the ship before the boys went off to investigate car rental agencies, and I went to the post office.

Forrest walked up town with me and told me of the warmth and hospitality of the New Zealand people. He had arrived tired, disheveled, alone in a foreign country. He purchased slacks, shirt, and jacket at a local shop. The salesman asked him all the usual questions about life in America; then invited him to meet his wife and children; then dinner. Finally the family spent all weekend showing Forrest the sights of Auckland, driving him into the country, introducing him to friends, and offering the hospitality of their home. In a new suit, with new friends, and carrying a bulging portfolio, Forrest contacted the appropriate scientists and organized the New Zealand and of our expedition.

Auckland is a thriving city of about half a million people. The streets were filled with cars, taxis, buses, trucks all driving on the left hand side of the street. At the first two intersections I was practically run down as I watched for approaching traffic from the wrong direction. I tried unsuccessfully to cash some travelers checks at several different banks. I was becoming discouraged, but an understanding teller eventually referred me to the ‘Ladies Branch’ of the bank where amid luxurious surroundings efficient clerks filled my hands with New Zealand pounds.



After dinner Brad, Robin, and I walked around town. We passed coffee houses, interesting alleys, high buildings, and a theatre where an Australian company was presenting "Sound of Music." The lighted shop windows displayed merchandise that I had almost forgotten: suits, dresses, transistor radios, phonograph records, and books.

Returning to the wharf, we saw that the DWYN WEN crew had been busy. The deck was cleared and all the watertight grey boxes from the salon were stacked on the dock. The salon seemed twice its usual size. A Tongan tapa was draped over one of the couches; fishing floats from Palmyra and Swains hung from the ceiling; the galley was filled with cases of Dominion Bitter beer. Ship personnel and guests were milling around, laughing, singing, talking. The Commodore of the Yacht Club gave all of us temporary memberships. George gyrated through the steps of an interesting dance with a voluptuous Auckland girl. The party lasted until nearly dawn.

The ship was as quiet as a tomb when I awoke. I made my way through the messy salon, passed the overturned bottles in the companion way, to the deck where I saw a port bustling with mid-morning activity. On my way to the fruit store to pick up oranges for breakfast, I saw a newspaper headline: SCIENTISTS COME TO MEASURE EARTH'S TREMBLES. I bought all of the papers on the stand. "A scientific party from the University of California arrived in Auckland yesterday in the 106-foot American schooner DWYN WEN. With them were about three tons of sensitive measuring equipment being used in a survey of the world's vibrations." Each of us had a morning paper to read with breakfast.

Royd and I were engaged in a last minute conference with Jack before he left to arrange for a car rental. We saw Robin rushing down the wharf with his hands full of papers.

"I got leave, plus an extra day, so we have a full week! Diplomatic relation, you know. My car is being serviced and will be ready to go in the morning." He was as excited about the trip as we were. He clutched maps, travel folders, and an itinerary of North Island from the Automobile Association Touring Department. We arranged to meet on the wharf at eight the next morning.

It was a busy day on board ship. Before ordering new sails, Stan put the crew to work sanding and repainting the DWYN WEN. Forrest directed the Wellington truck driver as he backed a mammoth truck down the wharf and into position for loading the ocean seismic equipment. Bob and Brad sorted and labeled the equipment in various categories: completed tapes to be air mailed to the laboratory; land station operational equipment to remain with Brad; seismic spheres and deep

sea equipment to be sent to the TARANUI with Bob and Forrest; electronics equipment, no longer needed, to be shipped home.

The next morning the boys and I were on the dock with sleeping bags, air mattresses, duffle bags, cooking equipment, and food by the time Robin arrived. I made arrangements to phone Brad in a couple of days at which time he should know the exact location of the land station. He had to confer with seismologists in Wellington to determine the best spot for it on North Island. I planned to meet him there at the end of the week.

Camping out in New Zealand at the end of a severe winter leaves much to be desired in the way of comfort, but it is the best way to meet the people, learn about the country, and become a part of the local scene. We slept under a rainy sky at Whangarei, in below freezing weather on the shores of Lake Taupo, in a New Zealand government campground in Hastings, and for two luxurious nights in Robin's family home in New Plymouth.

We visited the giant kauri forests at Waipowa and were intrigued with the variety of vegetation. Dark evergreen pine forests were interspersed with palms and philodendron. It was as if the land could not make up its mind whether it was tropical or temperate.

The Te Kuiti area in western North Island is a paradise for speleologists. There are hundreds of caves, many still unexplored or even undiscovered. We spent several hours enraptured with the fragile transparent delicacy of the stalagmites and stalactites of Aranui, and in the cathedral and glow worm chambers of Waitoma.

We walked along the paths in the Pukehiti Rhododendron Trust where hundreds of acres of native bush have been preserved as a setting for some of the plant aristocrats of other lands. We met dairy farmers and sheep ranchers and were impressed with the spotless barns and stainless steel machinery, and the care with which the grazing fields are fertilized and reseeded each year. We drove for miles past rolling pastures, as smooth as a golf green, where ewes grazed and lambs frolicked as far as the eye could see.

We rooted for the home team at the rugby game in Palmerston North; rode the flying saucer at the Blossom Festival at Hastings; tasted wine at the Glenvale Vineyards at Bay View; went swimming in the thermal baths at Tokaanu.

We ate fish and chips in Hamilton; white bait fritters in Feilding; deep fried paua in Wellington; hocket at a farm in Taranaki; trifle at the Chateau Tongariro; smoked trout at Turangi; tea at a hostel on the slope of Mt. Egmont; and drank coffee with the captain on a freighter in the Napier harbor.

After our third day on the camping trip, I phoned Brad in Wellington. Bob and Forrest had just left on the TARANUI. Brad was leaving the next morning for the

Volcanological Observatory at Ruapehu where the New Zealand Department of Scientific and Industrial Research had a laboratory and seismic vault. I could sense a puritan uneasiness in his decision, and learned that Ruapehu offered the finest skiing on North Island New Zealand! Was it rationalization or objectivity that led to the decision? The local seismologists convinced him that it was the correct place, and also there would be an opportunity to coordinate their volcanological seismic observations with his background measurements on land and at sea.

Four days later the boys and I drove up the circular drive in front of the Chateau Tongariro and looked up a wooded canyon toward the snow covered peak of Mt. Ruapehu. Skiers were attaching skis to car racks, lacing boots, donning parkas, discussing wax and powder and technique. I looked forward to waxing my own skis and braving the slopes.

“Would you ring Dr. Bradner’s room for me please?”

“One moment.” The desk clerk checked the register for his room number. “I’m sorry, we don’t have a Dr. Bradner registered.” Fortunately I remembered the name of the seismologist from Wellington and asked for Ray Dibble. He wasn’t registered either!

What was I going to do now? The boys had to leave almost immediately as they had gone a day out of their way to deliver me to Ruapehu. I tried to remember what Brad had told me about the laboratory, I really hadn’t paid much attention, since our arrangements to meet at the Chateau had been definite. The clerk was still going over the records.....

“Just a minute, I find a Dr. Bradner here....but he cancelled his reservation by phone yesterday afternoon.” Now I was in a quandary. I tried to describe a laboratory that I knew nothing about, a New Zealand scientific organization whose name I could not remember, experimental programs that the clerk knew nothing about. She asked the other employees in the office. Finally the manager....

“Oh, you must mean the DSIR Observatory?”

“Yes, I guess.”

“Turn left on a dirt road behind the Chateau, drive passed the staff dormitories, across a bridge and up the hill.”

The snow was thawing on this warm September afternoon, making the road muddy and slippery. A frame cottage that looked like someone’s unused summer home appeared at the top of a short steep hill. Through the window we saw a familiar face. We’d made it!

Having been in a state of uncertainty for the last half hour, it was doubly good to see Brad and meet Ray Dibble. They were staying here at the observatory. I looked around: one small bedroom, occupied; bath room, unusable (clogged septic

tank); chart room, occupied; the laboratory, surrounded by counters and racks of recording instrument, some bed springs leaning against a wall; and a tiny photographic laboratory. It was cold, the only heat seemed to come from the plate below a boiling tea kettle. After two months on a rocking ship followed by a week of mid-winter camping, I had really been looking forward to a proper bed, civilized hotel, and served meals. Brad could sense my disappointment and said, "We can always move down to the Chateau, but I thought it might be fun to camp out in the DSIR observatory." Always ready to adjust, I answered,

"Of course, it would. I'd love to stay at the observatory."

The boys were anxious to leave in order to reach Rotorua before dark. It was difficult saying goodbye to three wonderful traveling companions and settling down as a seismic wife in a volcanological observatory.

I put on my heaviest ski clothes, after ski boots, tied a muffler around my neck and walked with Brad to see the land station set-up in the seismic vault a half mile from the observatory. Mud encased our boots with every step, the tree branches over-hanging the narrow trail did not shield us from the freezing rain, the unsteady boards across a muddy stream were slippery. The dampness and rain gave an eerie and mysterious feeling as we proceeded through the woods to a small clearing where a shack nestled among the trees. The romance of travel, the excitement of science, the beauty and friendliness of New Zealand left me. I thought of home: the roses would be blooming profusely now, my extra firm foam mattress never seemed so desirable before, the distance between me and my daughter became excessive. September was the time for tennis, swimming, and beach picnics. I bit my lip and entered the seismic vault.

The first room, about the size of a broom closet, was dark except for feeble light coming through the half open door. The familiar land station recording box blocked the door from opening wider. Brad removed the tapes and set new ones. The inner room must be kept completely dark, so we huddled together and closed the entrance door before opening the door to Ray's laboratory. Our eyes soon became accustomed to the small amount of illumination from the red darkroom light overhead.

The inner room was less than six feet square. A conventional seismometer sat on a concrete pedestal in the middle of the room. A galvanometer light and mirror made a photographic record on sensitive paper wound on a rotating drum. Brad had put his seismometer on the concrete pedestal too and had brought the electric leads out to the recorder in the outer room. Ray had installed a third seismometer in the vault during the time of our experiments at Ruapehu. It could make a continuous seismic record for a month on a specially built magnetic tape machine. The tape

traveled at only a thousandth the normal speed of a commercial home recorder. This combination of seismometers allowed Brad and Ray to obtain a continuous low resolution record plus two separate high resolution records twice a day. Thereby they could separate local disturbances from general background microseisms.

There had been activity at the observatory while we were gone. The other guests had left, plumbers had completed repairs on the septic tank, the building was comfortably warm, and Chateau dinner reservations were available.

Brad and I took long hot showers before dressing for dinner. I put up my hair, did my nails, and wore make-up and perfume. High heeled shoes pinched feet that were calloused and widened from having been bare for almost three months. I wore pearls with my black dinner dress and aired my coat outside for an hour to remove some of the diesel fuel odor. I hardly recognized Brad in his dark suit, white shirt, and necktie.

Thick carpets, soft couches, crystal chandeliers, soft orchestra music, handsomely dressed people filled the lounge. We had an aperitif before sitting down to a sumptuous seven course dinner. Coffee, brandy, and dancing followed.

Brad was already up when I awoke and saw Mt. Narahoe framed in the window. The cold winter drizzle reacted with the hot volcanic cone, and a plume of steam billowed from the summit. The volcanological observatory was built in the tussock between the two active volcanos of Tongariro National Park: Mt. Ruapehu last erupted in 1945; Mt. Narahoe in 1954. Scientists from the New Zealand Department of Scientific and Industrial Research as well as scientists from all over the world come to the observatory to make measurements.

By the time I got up, the men had already taken off for the seismic vault and the early runs. When they returned breakfast was ready. I had boiled eggs, made tea, and finally successfully toasted bread on a one burner hot plate. An extra-curricular expedition was in the offing. I dashed through the dishes in the dark-room sink and packed a picnic. They rewound tapes and recorded data. We took off for a trip through the geothermal area of New Zealand.

We drove down the mountain through the native bush, passed summer cottages hugging the shores of Lake Taupo, admired the turbulent waters of Hukka Falls, and climbed the canyon of thermal wells at Wairaiiki.

Here at Wairaiiki caverns of steam are trapped a few hundred feet below the surface. These caverns have been tapped and the steam piped to a generating plant to provide about ten percent of the electricity used in New Zealand. After the main field was brought in, experimental drilling continued around the edges. Some bores were productive, others did not reach steam. Bore No. 204 was unique.

The drilling operation for 204 had proceeded routinely, but at 1200 feet an earth shattering explosion took place. The drilling pipes and machinery were thrown hundreds of yards. When the internal explosions quieted down and the steam drifted off, a crater fifty feet in diameter filled with rapidly boiling water appeared. Now, two years later, the activity is still continuous. Rumbling and roaring accompany the earth movements. Minute cracks opened two or more inches every time the earth groaned beneath our feet. We felt the heat of the ground through the soles of our shoes; the rocks were too hot to touch. Occasionally a chunk of earth at the edge fell into the boiling cauldron. Ray assured us that the area had remained much the same during the two years of activity and that we could approach to within a foot of the crater safely. However, I kept my distance to about three feet where I spent several excitingly terrifying moments.

We made a brief stop at Ray's seismic station on the slopes of Mt. Tarawea; walked across the colorful petrified terraces at Waiotapu; fed fourteen-pound trout at Fairy Springs; ate our picnic in the Meeting House of the Maori Model Village.

Rotorua, a concentrated area, contains geysers, hot springs, mud pots, steam vents, mineral pools — a spectacular thermal wonderland. Colorful Maori guides showed us how they cook in the hot pools and wash clothes in the warm streams. Steam is everywhere: coming from the wood pile, blowing through the gardens, rising through porch cracks, and seeping around tilted headstones in the cemetery.

We returned to Ruapehu and the instruments. Brad recorded background microseismic noises on land; Bob and Forrest were doing the same thing at sea over the Chatham Rise. Rain continued but, at the top of Ruapehu, the moisture was coming down as snow.

The mountain road wound up the canyon through native bush, across dormant lava fields, beside rushing streams, into the high white snow country. Skiing is a relatively new sport in New Zealand. The only chair lifts are on Ruapehu, they are slow and primitive. However, riding is much better than climbing and we looked forward to trying our skill on the slopes. At the top we could see a tractor about ready to haul skiers higher up the mountain. We rushed over and took the last two seats on the Whakapapa Snow Cat for the hour long trip across the snow fields, up the glacier, to the summit and steaming crater of Mt. Ruapehu.

We hiked the last few hundred yards to the summit and looked directly into the crater. At the topmost spot we put on our skis, adjusted bindings, cleaned our dark glasses, and took off over miles of unbroken glacial snow. With a hoot and a holler we swept from one side of the valley to the other, over a col and down the headwall, singing and shouting at the tops of our lungs.....nothing but the great white silent

world to hear us and send back our echos. The isolation ended when we approached the populated skiing fields.

The packed slopes were an anticlimax, but the enthusiastic New Zealand skiers introduced us to the hidden slopes in side canyons, included us in their games and races, and invited us to their Lodge party in the evening.

We spent a few very pleasant days in Wellington with Ray's family when the TARANUI returned from its ocean voyage. Bob and Forrest said that life on the steamship was enjoyable once they became accustomed to wearing a coat and tie for dinner, and after they adjusted to table cloths and napkins and acres of silverware on each side of the plate. The work had progressed well in the heavy seas off the Chatham Islands, and the much needed double drop produced the essential twin records.

And so, the Deep Ocean Seismic Expedition came to an end. The rolls of magnetic tape were already on their way to the laboratory in La Jolla for detailed analysis. Spring had arrived in New Zealand, and our final full days in Wellington passed rapidly.

Brad supervised the packing and crating and listing of all of our equipment and searched for magnetic tape for the land station recorders which Bob and Forrest would hand carry for a measurement in Tahiti. The men called on the French Consul to obtain permission for a measurement on French territory. Between trips to the airline companies to arrange passage for Bob and Forrest, paying respects to the American consul, renewing friendships with New Zealanders we had met before in California, and getting acquainted with the DSIR scientists and their families, I rode the cable car to the highest point in the city, walked through the botanical gardens, visited the stock exchange, shopped for souvenirs, and became a familiar sight on the dock as I picked up and delivered messages.

Brad and I accompanied the crated equipment on the night steamer to Christ Church. What a contrast to the DWYN WEN! Inner spring mattresses, spotless linen, and morning tea served in bed. We delivered the equipment to the headquarters of the American Navy operation "Deep Freeze," where planes were arriving daily from the United States with equipment, personnel, and supplies for Antarctica. A returning plane would carry all the deep ocean seismic materials back to the United States. Once the crates were transferred, Brad's New Zealand responsibilities were over and he took his first vacation in several years.

The objective of our week on South Island was to ski the longest glacier in the Southern Hemisphere, the Tasmin, at Mt. Cook National Park. For advice we called Father O'Gorman, the best known and best loved of all South Island skiers, with whom we had been in correspondence. He took us to lunch and told us about the

glacier, how Sir Edmund Hillary had done his early training for the ascent of Everest on the cliffs and mountains above the glacier, how Stein Erickson skied mambo-style for miles down the fall line, how inaccessible the glacier was until recently. He gave us the name of a guide, recommended a hotel, gave advice on remote glacier skiing, and emphasized the importance of contacting the ski plane pilot immediately. He loved skiing, he loved the glacier, and he wanted to with us, but the first flights were leaving for Camp McMurdo in Antarctica within a few days and he was scheduled to go along as chaplain. However, he introduced us a skiing friend who dropped everything and went with us to Mt. Cook.

The clouds were gathering in the early dusk as we drove the last twenty graveled miles to Mt. Cook National Park. Snowflakes were falling when we parked in front of the Hermitage. We had been looking forward to Mt. Cook ever since the first possibility of a trip to New Zealand had arisen. We had four days. We needed one for the ascent and descent of the Tasmin.

“Where do we make reservations for the ski plane up the Tasmin? How do we arrange for a guide? How early do flights leave?”

“The pilot will contact you in the lounge after dinner. The Chief Ranger can arrange a guide at the National Park Headquarters. Flights leave as early as 8 a.m., if they are able to fly.”

“Are the forecasts for clearing weather? How long do storms usually last?”

“Some people spend two or three weeks at the Hermitage without ever seeing the mountain.”

We weren't too worried, lady luck has always been on our side. During the evening we met the guide and contacted the pilot who would phone us at 7:30 the next morning to let us know whether he would be able to fly. After our small coffee blacks, a snifter of brandy, and a couple of dances, we retired to be well-rested and ready for the mountain.

At seven the chamber maid knocked, came in with morning tea, and opened the curtains. A heavy layer of fresh snow covered everything. Fog hid the nearby peaks, and we knew that the glacier was socked in.

We spent the day climbing near the hotel, crawling through the ice caves on the lower glacier, and eating. The meals at a New Zealand luxury hotel never end. We started out with morning tea, followed by breakfast, then mid-morning coffee with tiny sweet rolls. Lunch was a four course meal, but afternoon tea consisted only of dainty sandwiches and cakes. A platter of hot hors d'oeuvres accompanied cocktails before a seven course banquet. Supper was served around eleven. We skipped supper and went to bed early.



Seven a.m., morning tea, curtains opened....sunshine! The sound of a single motor plane broke the silence and we hurriedly got into our ski clothes. The phone call came.

“I’ve flown to the summit already this morning, the winds are bad and we were not able to land,” said the pilot. “I’ll keep in touch during the day and let you know when we can take off.”

We spent the day in the Lodge close to the telephone. We were the only guests at the hotel who wanted to ski the Tasmin. An elderly couple from New Caledonia hourly reported changes in weather to us; the manager and bell boys sympathized with us; a delightful British Colonel invited us for coffee on his balcony which gave a sweeping view of the mountain.

We enjoyed Col. Peter King, a charming British aristocrat, who had worldwide business interests as well as a seat on the British stock exchange. His health was not good and he was going into semi-retirement at Corfu. With his broad experience and knowledge, he was able to give us coherent accounts of the political and economic picture of New Zealand and Australia and the problems he faced in attempting to build a chain of American type motels in New Zealand. He told us of the prestige resort hotel he had under construction at Dunk Island on the Great Barrier Reef of Australia. We told him of our Seismic Expedition on the DWYN WEN and learned that he too loved sailing, but he was afraid his sailing days were over. He grew enthusiastic about the possibility of chartering the DWYN WEN for promotional purposes for the opening of the hotel. I gave him Stan’s addresses in Tahiti and Honolulu.

After dinner the pilot joined us. “Maybe tomorrow,” he said. We had only two days left. Everyone in the hotel from the manager and most distinguished guests, to the chamber maid and bus boys was keeping his fingers crossed for us. They knew how much we wanted to make this trip and as New Zealanders wanted to extend the hospitality of the mountain. We were beginning to get a bit discouraged. The wind had shifted. Did this mean that a storm was approaching from another direction?

Peter shook our hands warmly when he said goodnight and added, “May your hopes and wishes reach fulfillment tomorrow, I am praying for your success.”

We had barely tasted our morning tea when the phone rang. “Can you be down at the airport in forty-five minutes? Conditions are perfect on the glacier.”

Yippee! We stuffed sweaters, camera, sun tan lotion, maps, scarves, and dark glasses in our belt packs. Hotel guests waited for their breakfast while the chef prepared our lunches. They gathered on the porch to see us off as we drove the half mile to the air strip. Our guide was waiting with emergency supplies and ice axe.

It was a tiny plane, with room for only two passengers, but our guide was able to curl up in the tail-end of the fuselage. The pilot tied our skis to the underside of the wings. Landing skis flipped into place under the wheels as soon as we were airborne.

We circled over the moraine and glacial stream to gain altitude above the lower glacier. The bright winter sun striking the snow fields almost blinded us as we continued up the main flow past the side glaciers, the rugged mountains and the mammoth ice falls. From the air we tried to pick out the best routes for the descent.

A smooth curve appeared across the unbroken snow as the plane coasted toward the col and stopped. Only the occasional thundering of an avalanche broke the silence. The snow was hard and fast and we pointed our skis downhill in parallel cristics, leaving interlacing patterns of our ski tracks, parallel patterns as we skied side by side, an occasional wide downhill track where someone goofed, one leg royal cristic marks by Brad, and complete confusion when I tore up the surface with an egg beater. Single file we raced through the huge hunks of ice of the falls, and roped into a crevasse to reclaim a lost belt pack. Below us in a wide valley we could see the pilot standing beside the plane. And with long sliding motions we skated the last mile.

When we returned we were greeted with warm congratulations and presented with certificates. The mountain had extended to visiting Americans the hospitality for which New Zealand is famous. We gave our thanks to the pilot and guide; invited Peter to spend a week-end with us in La Jolla; and said goodbye to our South Island friends.

A long exciting and productive summer was over. We looked to the east across the Pacific to home, 7,000 miles away.

## CHAPTER XII

### NEVER THE SAME AGAIN

Our South Island hosts waved from the Christ Church airport as we left on the first lap of the long journey home. Our New Zealand seismic colleagues waved from the Wellington airport as we took off on the second lap. Wistful farewells were tempered by a pleasant unexpected meeting with Col. Peter King, and we continued on to Auckland together.

We were met in Auckland by Sam Wathan, building contractor and executive vice president of the Ruapehu Ski Club, who had promised to show us around the area.

When we stopped for coffee on Queen Wharf, the harbor medical examiner asked if we had seen the ship.

“What ship?”

“The DWYN WEN, of course.”

The DWYN WEN should have sailed from Auckland ten days before! We left our untouched coffee, dashed outside and saw the masts of a large ship over the roof tops.

When we reached the ship, Stan was supervising the loading of diesel oil; Dirty Dave had his hands full instructing novice seamen on the procedures of casting off; Big Jim and John were lashing the shore boats; a new man was stowing fresh produce below; four girls were being photographed. Everything stopped when we jumped on board.

Questions and answers tumbled forth as we brought each other up to date. During the return trip to the United States, a South Sea adventure movie was to be filmed, the story revolving around the four attractive New Zealand girls who had signed on as crew members. John and Stan plied Brad with questions about the New Zealand experiments; they still closely identified themselves with the Deep Ocean Seismic Expedition.

I could hardly wait to tell Stan about Peter and Dunk Island. Stan knew of Dunk Island and became as excited as we were about the possibility of organizing a DWYN WEN trip for the opening of the hotel the following summer. He carried thoughts one step farther: once he got as far as the Great Barrier Reef, he would go on to Sumatra where he would be able to replace some of the original Burma teak of the ship. I invited Stan to join us for cocktails with Peter but the long awaited departure of the DWYN WEN took priority.

I had left the DWYN WEN a month before, and now she was leaving me. I was sad when I waved goodbye. I ran to the end of the breakwater and waved again.

We drove to the top of the highest hill in Auckland and watched until she rounded Rangitoto Island under full sail.

I had a far away look in my eyes, but I soon came down to earth when Sam drove us around Auckland to the top of Mt. Wellington, along the hilltop drive through an unspoiled natural domain where we had magnificent views of the Pacific to the east and the Tasman to the west, and visited several building projects that Sam had under construction. He joined us for cocktails with Peter and the two men got along very well together. Sam understood Peter's frustrations in attempting to build in New Zealand and was able to offer helpful suggestions. Sam included Peter in the dinner invitation at his home. Peter confided to us that he was very impressed with Sam and was strongly considering him as the contractor for his series of New Zealand motels.

Peter had gotten discouraging reports from his doctors during the afternoon. The throat constriction that had been bothering him for several years had taken a turn for the worse. The doctor said that it was the result of nervousness, tension, and overwork and it was essential that Peter take a month for complete relaxation. This had its good side too.....Peter had decided to relax at Korolevu on Fiji and had made reservations for our flight the next evening. This meant that we would have two unexpected days with him on Fiji.

Sam drove all of us to the airport the next evening. Fortunately he had a luggage rack for the bags and my skis, because his small car was filled with people. Over a final coffee at the airport before boarding time, Peter obligingly changed a few New Zealand pounds to Fijian money for us. We had completely overlooked the fact that a different currency was needed on Fiji. As soon as we were airborne, Peter came forward and invited us to join him for champagne in first class. The short flight passed quickly. Peter had cabled ahead for a Fijian driver who was waiting for us at the airport. For the next two days Peter and his driver were our guides around Nadi.

The tapas in Fiji are beautiful and more imaginatively painted than those we had seen in other places. I had mentioned my desire to have a tapa made using the DWYN WEN as a motif. Fiji seemed the place to have this done. Peter knew several tapa makers in Korolevu, one of who was outstanding in copying designs or creating a pattern from a sketch. Did we have a picture of the DWYN WEN or could we sketch the rough outlines? We gladly gave him the newspaper picture of the ship leaving Auckland which he promised to return with the tapa when he visited us in La Jolla. We pressed a few pounds on him to pay for the tapa.....it would be the exciting climax to my tapa collection.

Again, as with other friends from the trip, it was hard to say goodbye. Friendships spring up much more quickly when traveling than they do at home, but we would see Peter again soon.

Tahiti was even more than we had expected. Midnight in Tahiti.....warm air, gentle trade winds, fragrant flowers, native orchestra, and sarong-clad girls dancing the magnificent Tahitian hula.

The quay in Papeete in early morning was active. The DWYN WEN crew had told us that you always meet someone you know on the quay, but we didn't know anyone in Tahiti. So it was a great surprise when the first words we heard were, "Well, if it isn't the Bradners!" It was the skipper of the MALABAR VIII who had sailed into the Palmyra Lagoon with Gordon and Jay four months before.

The French authorities told us of the seismic land station experiment and pointed out the location; the Club Mediteranee invited us to spend the week-end at their diving camp (unfortunately our time was too short to accept); I engraved 'Tapa Queen' on Quinn's bar for posterity; Quinn's girls invited us to La Fayette where we danced until 3 a.m.; we recorded the beauties, scenic and otherwise, of Tahiti on dozens of frames of color film; the world passed by as we sipped coffee at Vaimas; Tahitian girls climbed half-naked to the deck of a French frigate via the anchor chain; we gorged on raw fish, coconut cream, papayas, and mangoes; and we visited Moorea.

The first close-up view of Moorea comes as a breathtaking shock. No island could be more awe-inspiring. The azure sea fringes the reef and the complex coral formations, emerald waves foam up on the sandy shore; the pure white beach merges into the foliage where small thatched cottages peek out at the interloper; rugged green mountain pinnacles, rising to the clouds, seem to go on forever. Muk and Kelley met us on the dock with flowers and tall cool drinks, and showed us Cooks Bay, Letag's black velvet paintings, a tiny church whose paintings and sculptures were pure Tahitian.

We took off our Tiare Tahiti crowns as we boarded the plane for home. They ended up adorning the Tahitian maintenance men making the final checkout of our jet.

"Please fasten your seat belts, we'll be landing in Los Angeles in fifteen minutes." We could see the smog, the unimaginative little boxes called houses, the clover leaves in the freeways. Did we really want to come home?

The customs inspector scratched his head and said, "I've been in this job for twenty years, but this is the first time I've ever seen a pair of skis come in from Tahiti!"

Bari's happy voice on the long distance telephone was reassuring. "Mom and Dad, welcome home!"

Our big old Siamese cat greeted us, "Meowrrr....," and rubbed against our legs.

Home. The house was there; the yard was overgrown; the piano needed dusting; and mail was stacked to the ceiling.

It didn't take long to fall back into the patterns of work, pressure, responsibility, community, society. The town and university had grown during our absence. The Institute of Geophysics and Planetary Physics building had been completed; the first college of the university was taking shape; high rise buildings loomed on the La Jolla waterfront.

The Tongan tapa arrived. To my comments that I didn't think there was a wall in the Institute large enough to hang it, I was answered, "Don't be ridiculous, no tapa could be larger than that wall." We measured. It was.

As an alternative the architect and interior decorator suggested draw drapes for the conference room. After eight weeks of experimentation a glue was found that would withstand the beating afternoon sun and remain soft and pliable, and a backing material that would reflect the heat and completely darken the room for slide showings. A royal-blue carpet, rough-hewn redwood walls, and the tapa drapes now frame a view of the rolling surf and white sand of the La Jolla Shores beach and cove, to Alligator Head, and on to the distant horizon beyond which 6,000 miles away lies Tongatabu where the tapa was made.

Brad devoted days and evenings to data analysis. I tried to get caught up with the family business and correspondence. I was in the middle of a long letter to the DWYN WEN crew when the phone rang.

"I have a cable from New Zealand for Dr. Hugh Bradner."

"I'll take it."

"KING A FRAUD WANTED BY POLICE IN AUSTRALIA STOP IF INFORMATION AVAILABLE WHEREABOUTS CABLE TURNER MANAGER NATIONAL BANK BRISBANE." Signed, Sam Wathan.

Amazing! There must be some mistake. The cable couldn't possibly refer to Peter, not to our friend Col. Peter King.

Australian and New Zealand newspapers arrived a week later:

'CHAMPAGNE PERCY' BEAT DEPORTATION.

PERCY DUPES POLICE CHIEF - Champagne Percy King's confidence tricks in Sydney this week reverberated through two parliaments and the police forces of two nations.

PERCY FLEES WITH FORTUNE - Champagne Percy, bogus British colonel and prince of shady showmanship, has at last burst his bubble rudely in Australia's face.

Until I saw the photographs I could hardly believe that these headlines referred to our charming companion of a month before. But there was no mistake. Col. Peter King was Percival King well-known by the police on two continents and Interpol. We might never have known of Peter's past if he had not chosen another La Jolla couple and Sam as his victims.

We learned that Percival King spent the first thirty years of his life respectably in England. He first started getting into trouble with the police in 1929, and for almost twenty years he was constantly in and out of jails. In the mid-fifties he came to Australia as Col. Peter King, prospered in business and married a highly thought of Australian girl. He became popular in social circles of Sydney for his wit, intelligence, and interest in cultural and philanthropic activities.

In the meantime the Australian parliament had become aware of the prison record of Percival King and debated whether he should be allowed to remain in the country. A deportation hearing was set up. Several commendatory letters were submitted for Mr. King, written by some of the most influential men in Australia. The deportation charges were dropped. It was not until King had left Australia with a fortune that the truth came out. King had approached each of these men with the story that he was being considered for knighthood, and each man enthusiastically wrote to Parliament of Peter's outstanding character, intelligence and wide-spread philanthropies.

One of Peter's greatest philanthropic successes was the barbecue to raise funds for the Police Boys School. While Peter appreciatively watched, a squad of policemen descended to erect a protective marquee in case it rained. Peter was reluctant to host such a function unless he could be assured there would be no gambling or selling of liquor, as often happened at private fund raising fetes....the Police Boys School had a high principled benefactor. This gala affair was one of the highlights of the Sydney social calendar. Peter had spent tireless weeks preparing for this function and immediately afterwards went off for a much deserved rest. The police commissioner, in full uniform, saw Peter off as he absconded with the funds.

It was while Peter was on this well-deserved vacation that we met him at the Hermitage and were impressed by the British aristocrat and Australian industrialist. No wonder, the Auckland doctor found him nervous, tense and overworked. He had just pulled the biggest coup of his notorious career.

After four weeks of complete rest and relaxation at Koralevu, Peter continued on his travels. In Tahiti he met a La Jolla couple and introduced himself as the

comptroller of a large hotel chain, investigating the purchase of an ocean side hotel just outside Papeete, and as a close friend of the Bradners.

He then changed his plans and returned to Auckland in time to contact Sam, who joined him in meeting the Bradners' La Jolla friends. For three days the La Jolla couple were wined and dined and introduced to the scenic, historic, cultural, and entertainment spots of the Auckland area. Peter accommodatingly consented to exchange Australian pounds for American dollars. The pounds were in the form of a check on an Australian bank, which did not cause suspicion, because Peter also gave a personal letter of introduction to the bank president, asking him to extend every courtesy to his American friends who were visiting Australia for the first time.

In the meantime, Peter had been discussing with Sam the necessary remodeling of an Auckland hotel that his company was taking over, and offered Sam the contract for the \$200,000 remodeling job. He was to send the contract and specifications to Sam as soon as he returned to the head offices in Los Angeles. Sam readily cashed Peter's personal check.

Peter hosted a farewell dinner celebration, complete with French champagne, on his last night in Auckland. The next day, Sam and the La Jolla couple started to compare notes. Neither of them knew Peter well, Sam knew us only casually, the La Jolla couple didn't know us at all. They decided to investigate in Auckland and Australia. The cable was the result of their investigations.

Peter is an impressive artist in his trade. Not only did he swindle us and our friends, but also the Sydney police commissioner, the Australian parliament, some of the wealthiest men in Australia, and three wives. Not until too late did anyone suspect that he was anything but what he seemed. We pressed the pounds on Peter for the DWYN WEN tapa; the La Jolla couple initiated the exchange of money; Sam willingly cashed Peter's check; the police commissioner helped Peter with the luggage containing the boys school funds; the Australian parliament cancelled the deportation hearing; influential Australians contributed largely to the fortune Peter carried away; his three wives are now reviling him as the meanest cad and bounder in the international catalogue of swindlers.

Six weeks after we said goodbye to Peter in Nadi, the following warning appeared in a Melbourne newspaper: CAUTION - IT MAY WELL BE THAT AT THIS DAY PERCY KING MAY BE A REFORMED CHARACTER, HONEST AND TRUSTWORTHY. BUT, HAVING REGARD TO HIS EXTENSIVE RECORD, WE FEEL ONE MUST EXERCISE MUCH CAUTION.

We will probably never see Peter again, but I can't help feeling that perhaps he did have the DWYN WEN tapa made in Koralevu; perhaps it exists; perhaps some



day we will see it. However, at the moment, the possibility is only a never-to-be-forgotten anticipation in the South Sea adventures of the Tapa Queen.

For the next several months Brad was at his desk with calculations, examining theory, programming, and computing to determine how the ocean bottom quivers.

The three months spent in collecting the data were a short period indeed when compared with the long process of data analysis. It will take years to complete unravel the maze of information recorded on magnetic tapes. Brad, Jim, Bob, and Forrest have explained to me the masses of charts, graphs, formulas, and results of the seismic summer. They have established the background level of deep ocean microseisms. They have made a step toward settling the controversy of the origin of microseisms. They have identified sources of microseisms. They have learned the inadequacies of the equipment and how to modify existing instruments and devise new ones for continuing the research. They are planning future expeditions to further man's knowledge of the ocean floor.

The main purposes of the expedition were to determine where microseisms originate, to determine how they are produced, and to isolate individual sources.

Is the origin of microseisms on land, at sea, or in a few-hundred mile zone near shore? A comparison between land, ocean, and near shore measurements would indicate the origin by the strength of the signal. If the origin were at sea, the signal would be stronger on the ocean instrument; if on land, the signal would be stronger on the land instrument; if the origin was in a zone near shore, the strength of the signal would be greatest at this point. Results show that the bottom of the sea is a microseismically noisier place than previously anticipated. In fact, the bottom of the sea is a hundred times more agitated than land surfaces.

Two sources of microseism production were observed: reflection of ocean swell from the shore line; and mid-ocean storms. During the days when very large waves struck New Zealand, microseisms were clearly being produced by interaction of swell and shoreline. This production was not by direct pounding of the waves against the land but the more subtle effect of the reflection of standing waves from the shore. At these times the microseism peak was found to be big, and accurately twice the frequency of the ocean swell. The possibility that wave action on the surface could transmit energy directly to the ocean bottom is very remote. The movements of a choppy sea decrease rapidly a few feet under water, SCUBA divers observe that the ocean is very calm a hundred feet down even though there may be ten foot waves churning the surface.

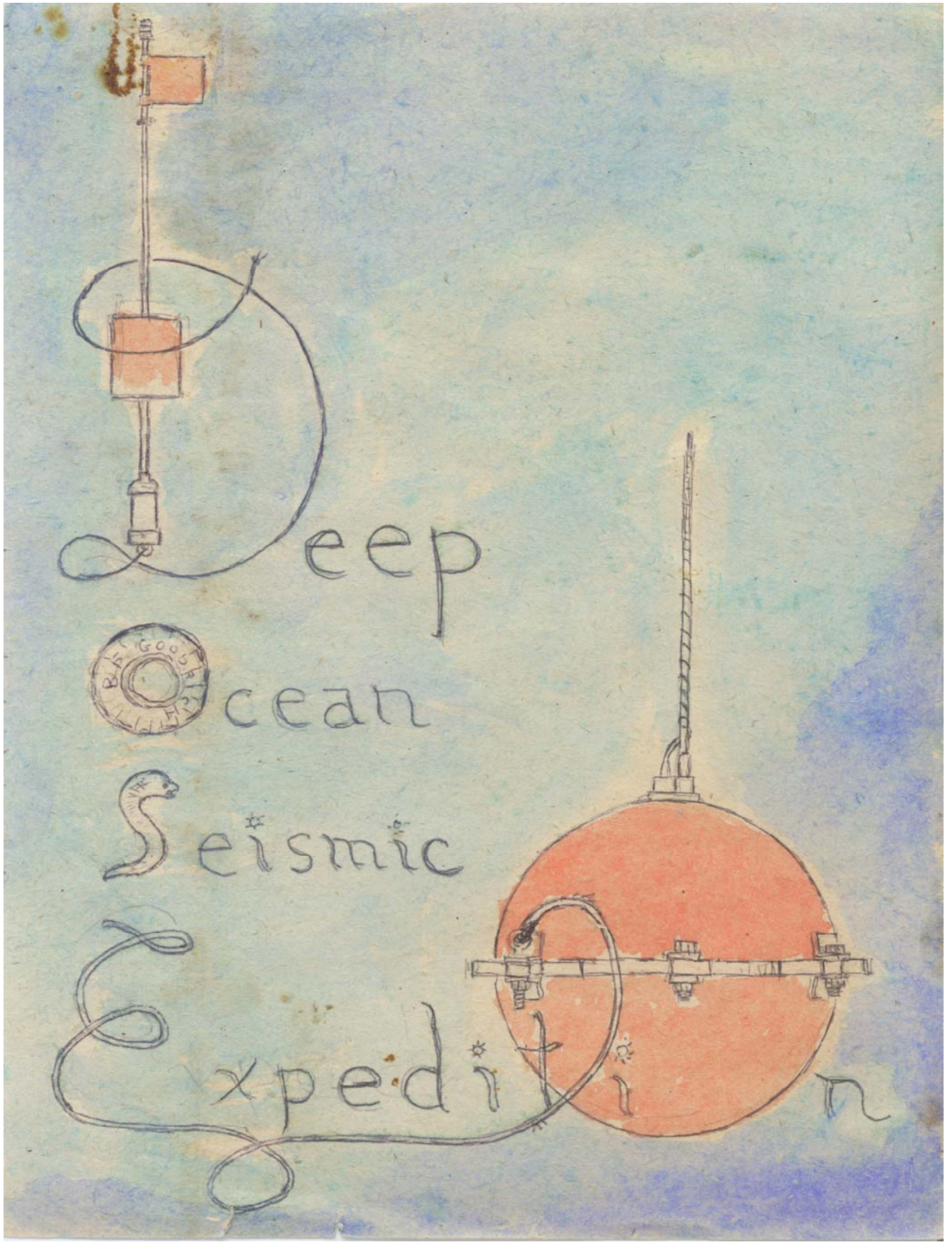
A recording in the open ocean several hundred miles from Swains Island and one 700 miles from New Zealand showed evidence for the generation of

microseisms in mid-ocean far from any land. It is probably that standing waves are set up under special circumstances near mid-ocean storms.

The isolation of individual sources of microseisms needs further study. If the microseisms originated at a simple localized source, the instruments could determine the type of seismic wave and the direction from which it came. But if microseisms of the same frequency originated simultaneously from several sources, neither the wave type nor the origin could be determined exactly by Brad's instruments. Additional experiments are being planned to further study multiple sources. This will be done by using two 3-component instruments set some distance apart. Correlation of records from the two instruments will enable the scientists to pinpoint microseismic sources accurately.


In comparing the spectra of ocean swell and ocean bottom microseisms, the results were found to be disappointing. The overlap in frequency between swell and seismic measurements was too small to produce any conclusive results.

Work on deep ocean microseisms continues. The Texas Instruments Company is using long term recording spheres sunk into the deep sea off the Aleutian chain; after a month on the sea floor, they pop up and are located by the techniques developed by Brad. What will they reveal? Much more than we learned in the short term recordings that Brad pioneered across the Pacific. A wealth of information on underwater earth quakes, clandestine bomb shots, minute movements of the earth's crust is waiting to be discovered at the bottom of the sea. Generations of geophysicists and oceanographers to come will study and learn increasingly more about the unknown ocean bottom. Horizons are unlimited. Theories on microseisms, tsunamis, and continental drift are waiting to be explored. What comes next?



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