

TE VEGA EXPEDITIONS
GENERAL NARRATIVE--INSTALLMENT 21
Dr. Rolf L. Bolin

The scientific party for Cruise 8 assembled at Pago Pago, the capital of American Samoa, on the morning of Sunday, June 20. Arrival was a bit hair-raising for the final group, since it was only after the fifth pass that the plane from Honolulu was able to set down on the cloud-and rain-obscured runway in a cross wind that developed gusts of up to 50 miles per hour. The steep mountains bordering the airfield did nothing to ease our anxiety in that thick pea soup, and when the wheels finally touched down on the clear end of the runway a sigh of relief went up, and we did not mind when the visibility was again reduced to a few yards by enveloping clouds before the plane had lost half of its landing speed.

Sunday and Monday morning were spent on indoctrination lectures, church attendance, quick excursions around the island of Tutuila, promenades along Centipede Row where the government officials live, and around the grassy oval that constitutes the main street of Pago Pago, in fraternizing with the local population, in topping off the fuel and water tanks, in laying in last minute supplies, in dodging rain squalls and hoping for the wind to abate.

At last, on Monday afternoon, we cast loose and set sail for Vava'u, in the northern group of the Tongan Islands, where we planned to give the students an indoctrination of coral reefs before getting down to plankton studies which are to be main object of this cruise. The weather had not improved, and before we had cleared the sheltered harbor, which is the flooded crater of an ancient volcano, the first victims of sea sickness proved that Marazene is not always an effective preventative. Southward we surged through rough seas that made field work impossible. It was thought that lectures might be in order and would present no hazard, so the ten students who felt they could make it were marshalled in the mess hall. Dr. Bolin began what he believed to be an interesting and timely talk, but one by one the students took a more or less hasty departure. It is shattering to the morale of the speaker to have his audience walk out on him, whatever the cause, and when the audience was reduced to five the meeting was cancelled.

On June 23 we sighted Vava'u and by midafternoon were anchored off the town of Neiafu. After medical and customs clearance, the senior staff paid a courtesy call on the Governor and, much to our dismay, were informed that he had no information concerning our permission to work in Tongan waters and that we would be confined to the ship until he could contact the authorities in Nukualofa for information as to what to do about us. Clearance was forthcoming the next morning, and our work began with a diving expedition to some shallow coral reefs in order to check out the students in the use of Scuba gear.

As we expected, all of the numerous inlets and channels that characterize Vava'u provide good coral areas and we visited several different places, all of them showing us something new. In one area we collected along a transect perpendicular to the shore from the tide line to a depth of 50 feet, beyond which the bottom plunged at an angle of about 45 degrees into the eerie deep blue of unknown fathoms. From forests of staghorn coral in shallow water, the seascape gradually changed until at our diving limit fantastic vase-shaped colonies, as much as six feet across, predominated. Sponges, anemones, sea fans and jelly-like soft corals grew on and among the stony corals; tube worms showed bright circlets of tentacles; Tridacna and cat's-claw clams were heavy enough to make us think twice before bringing them to the surface; small pearl oysters were attached to the sea fans; cone shells, spider shells, cowries, sea cucumbers two feet long and nine inches in diameter, sea urchins with needle-like spines more than a foot in length, crinoids and multi-colored starfishes crawled around and engaged our attention and clouds of fishes swarmed everywhere, seeking shelter in the coral thickets or simply cruising past in the water above us. On the following day we ran a poison station for fishes along the same transect and collected about 185 different species, one of the richest hauls we have ever made.

Since we are now in a region where mangrove swamps are becoming rare we took advantage of the narrow bank along the upper reaches of an inlet where mangroves grow to investigate this interesting habitat. It was not extensive enough to give the eerie impression that one gains in the middle of the mile-wide swamps of Indonesia, but the effect of the prop roots in collecting detritus and mud and thereby transforming sea into land was clearly evident, and such characteristic and interesting inhabitants as the mud-skippers, Periophthalmus, and the fiddler crabs, Uca, with their great colorful claws, providing a striking contrast to the fauna of the nearby coral reefs.

Not all of the time was spent on work. On Sunday some of our group went to church, while others risked prison by trolling (without success) from one of the Boston whalers. We did not learn until later that it is illegal to fish on Sunday in Sabbath-conscious Tonga. We bartered with the natives for tapa cloth and woven mats and shell necklaces. The Governor, apparently embarrassed by having confined us to the ship on our arrival, invited the senior staff to a sight-seeing trip around the island, which included tea at his residence and a most interesting visit to the Department of Agriculture's experimental farm, where an attempt is being made to diversify the copra economy by introducing pineapples and vanilla. Other members of the party had opportunities for similar excursions, visited with various people, and got to know the island fairly well. In turn we entertained the Governor, the doctors, the manager of the experimental farm, the inspector of police, the customs man and various other dignitaries on board. One evening we were all entertained at a dance in the large concrete-floored shed of the Copra Board.

On the morning of June 30 we set sail for Pago Pago once more. This time the weather was good and we were able to lecture to capacity crowds. Sir Alister Hardy was at his inimitable best as he launched into discussions of his beloved plankton, and no one would have left, seasick or not. The problem of getting to Samoa and out again before the end of the July 4 weekend kept us pushing along, with bathythermograph casts and keeping of the biological log as our only field activities. We made it into Pago Pago in the early afternoon of Friday, July 2, and proceeded at once to prepare for the next long leg of our cruise. Canton Island is the target.

TE VEGA EXPEDITIONS
GENERAL NARRATIVE - INSTALLMENT 22
Dr. Rolf L. Bolin

Pago Pago provided no new excitement, but the town was a place where we could purchase needed supplies for the long barren open stretches of ocean ahead, collect our mail, and quaff a last long cool beer or milkshake.

Early in the afternoon of Sunday, July 4, we sailed out of the lovely flooded volcanic crater that provides Pago Pago with such a perfect harbor. We coasted eastward along the southern shore of Tutuila under perfect conditions. It was a beautiful day of sunshine and fleeting cloud shadows patterning the steep green hills that rose behind the white line of driving spray where the brisk wind picked the tops from the thundering breakers.

Rounding the eastern end of the island we headed almost due north for Canton Island, and soon broke out the home-made high speed plankton sampler that the second engineer had built to Professor Hardy's sketches and specifications. Short trials indicated the need for simple modifications, which were soon accomplished, and we were in business. A half-hour tow yielded exactly nothing, and Sir Alister could hardly believe it. We tried again and again, and after a while a tow of one hour provided us with two somewhat mangled foraminiferans (Globigerina). The net was at least working. After a while we caught a couple of arrow worms (Sagitta), and by then our eminent British colleague was fully convinced that we were actually traversing a real marine desert. However, he took heart in the slow progressive improvement in the catches and hoped for greener pastures toward the equator.

Since the Tokelau Islands lay almost directly on our route we took the opportunity to stop briefly at Fakaofu Atoll on July 6. This atoll consisted of a rough ring of about 30 small palm-covered islands surrounding a fair-sized lagoon. There was a native population of about 800, who, although there seemed to be more spacious and suitable locations, were all concentrated in a single village on one of the smaller islets. There was also a detachment of half a dozen New Zealand Army engineers working to build a landing jetty to facilitate the loading of copra, the atoll's only cash crop.

The local dignitaries, the chief, the native medical practitioner, the policeman, and the lieutenant in charge of the army detail came out in a whale boat to meet us and we made arrangements for work in the lagoon. They said that it would be better if we used their boat for the trip in, and we accepted and loaded up our gear. Although it was fairly high water we had a little difficulty getting in. There was no boat passage into the lagoon and we had to cross the algal ridge which characterizes the weather side of reefs. We grounded several times, but finally made it to the shore at the village, and we were thankful that we were not in our own boats. We carried our air tanks, flippers and face plates, our nets and tubs, our fish poison and formalin through the very neat and clean village that was laid out with coral-graveled streets in a rectangular pattern, to the lagoon shore. Here we loaded everything into two small landing barges hooked together, which were placed at our disposal by the army, and set out for the lee side of the reef where our activities would not affect the life of the village.

Unfortunately, the reef we found to work on was not very rich. Much of it was dead and neither the invertebrates nor the fishes were spectacular. We got nothing new, but we saw very clearly the effect of silting in lagoons. At the base of the reef parapets and around isolated coral heads fine white silt was slowly accumulating and choking out the corals under a blanket of material having the consistency of soft ice cream.

While we were working, the village had been preparing for our return. As we pulled in to the shore about 20 women paraded out to us in single file, each one bearing a plate with a fried egg and two deep-fried biscuits (hush puppies Tokelau style) with jelly, and a glass of some sort of soft drink. It was a marvelous friendly gesture, and as we ate, three old ladies, inspired by the festive occasion, entertained us with an impromptu dance that ended by their falling into the lagoon. Some of our party tried dancing also, and we, and all of the people of the village who formed a dense half circle around us, thought the whole affair was hilarious.

When it came time for us to leave we received gifts of woven baskets, shell necklaces, and cowries, thanked our hosts and loaded into the whaleboat once more. The tide had receded considerably and the boatmen had to walk us out across the reef. We would be sitting high and dry one minute, and then a big comber would dash in while the boatmen held on in waist-deep water and then gained a few yards on the backwash before we sat dry on the coral pavement once more. As we approached the edge we could see the water pouring off the reef rim in a waterfall about three feet high before being smothered by the next breaker. At last we made it and everybody made a mad jump for the boat as we floated free and began to pull off shore in the gathering dusk. When we reached the ship we gave our new friends a few cartons of cigarettes as a small token of our appreciation and set off northward once more.

We spent considerable time rigging up closing gear for a one-meter plankton net and testing gear and took a 1000 meter hydrographic station. On our arrival at Canton Island we found the sea rich in life again and the air full of birds supported by the teeming plankton below. Instead of taking the ship at once through the entrance to the lagoon (which is noted for its fierce tidal currents and can be entered only at time of slack water) we lay off shore for two days and took surface and 60-meter hauls with one-meter plankton nets and deep hauls for meso- and bathypelagic organisms with the Tucker trawl. The laboratory was full of all sorts of interesting animals from protozoans and medusae to pyrosomes and fishes. Siphonophores with glassy nectocalyces, so transparent that they were invisible until lifted from the water; tiny deep blue Physalia from the surface; copepods of the genus Saphirina, gleaming like opals as they refracted the light; hyperid amphipods with gigantic eyes covering the entire head; pelagic snails (pteropods), swimming with flaps of great butterfly-like wings; Phylosome larvae of spiny lobsters with disk-like bodies through which we could read print with perfect ease; the rare and primitive cephalopod Spirula, a living fossil and a relic from past geologic ages; Gnathophausia, the giant scarlet mysid from the

deeps; silvery hatchet fishes looking as if someone had taken a bite out of their bellies; black melanostomiatoids with beautiful luminous organs and fearsome saber-like teeth; all these and many more engaged our attention and made Sir Alister a happy man.

At last, late in the afternoon of July 10, we took advantage of the slack water to negotiate the tricky passage into the lagoon and tied up at the wharf just inside the entrance.

TE VEGA EXPEDITIONS
GENERAL NARRATIVE - INSTALLMENT 23
Dr. Rolf L. Bolin

Canton Island, an Anglo-American condominium, is not much to look at. A bleak coral-sand island, it stretches as a narrow belt around an oval lagoon about nine miles long, which is open only through a narrow break at the western end. Twice a day the water rushes in through this pass like a raging river when the tide rises, and twice a day the river reverses itself on the ebb. The surging flow and the choppy six foot waves that it induces makes it impossible to enter or leave except at slack water. The equatorial sun blazes down on the white sand and gravel, relieved only by a very few stunted coconut palms and scattered isolated shrubs. It looks like a desert. When we first saw it, the desolate impression that I had gained on a brief plane stop 14 years ago was corroborated; we were sure we would not like it. However, we were made welcome by Mr. James Murphy, the island manager, who administers it and runs a satellite tracking station for NASA. He was so kind and helpful that we would have been happy to stay longer.

The island is the home of countless frigate birds, terns, noddies, gannets and tropic birds, so bird watching and identification became the order of the day. Fishes swarmed around the pier and were taken by hook and line. They provided material for Dr. Haderlie's work on fish parasites, and he pawed happily through smelly fish entrails until the wee hours of the morning, while we (and finally he as well) wondered why he had not taken up an easier and cleaner field of study. Oh well, everyone has his own hobby.

Mr. Murphy, when he heard that we planned to dive in the lagoon, warned us about the danger of sharks. On the other hand, Mr. Thomas Spencer, who spends as much time as he can in the water, pooh-pooed the idea that they were a hazard. The two points of view were explained to the students, and diving on Sunday was made optional, with a warning to those who were going into the water to keep a sharp watch and to be careful. Those who heeded Mr. Murphy's warning were taken on a tour of the tracking station. They reported that it consisted of a fantastic array of instruments, computers and recorders for monitoring practically everything in a satellite, including the temperature, respiratory rate and heartbeat of the astronauts themselves. Everyone who visited the station was tremendously impressed by the staggering complexity of the installation and the speed with which it could function, but no one seemed to understand the details of its operation.

Those who were not disturbed by the shark warning found the coral reefs immediately inside the entrance to be beautifully developed and as rich as one could wish. The strong tidal currents kept them swept free of choking silt, and there was practically no dead coral in evidence. Surgeon fishes browsed on the minute algae, while big parrot fishes chewed off chunks of the coral itself with audible bites, leaving gouged-out depressions on the solid rounded heads. Big groupers lurked under overhangs at the base of coral ramparts; silvery jacks, two feet long, cruised majestically about; big halfbeaks hunted in schools with their backs practically awash, and their color was so close to that of the silvery surface that they were almost invisible and looked like insubstantial ghosts. Of course, myriads of butterfly fishes, damsel fishes, wrasses,

squirrel fishes, apogonids, etc. swarmed above, around and through the thickets of staghorn coral or the fantastic gardens of vase-like types and flaunted their incredible colors everywhere. No sharks appeared, and the worst damage we suffered were a few stings from the plentiful fire coral (Milliporina) and a couple from the large hydroid Aglaophenia cupressina, commonly known as "fire weed."

Since we saw no sharks on Sunday, everyone turned out at slack water on Monday for another diving and fish-collecting foray. This time two sharks did come around to look us over, but they gave us no trouble at all, and the day was a success.

After having repaired one of our pumps, topped off with fuel and water (distilled from the ocean and therefore expensive), visited the Canton Island Club for beer, music and bingo, taken in the free outdoor movie, we shoved off on the morning of July 13, the second anniversary of our departure from San Diego. In spite of rough weather that hampered our work a bit, things were going fairly well until, with more than a mile of cable out and the Tucker trawl on the end of it, the hydraulic motor that runs both winches emitted a series of blood curdling shrieks and groans, and quit. It was only after over-riding the supercharger pump that we were able to retrieve the gear. The engineers poured over the instruction manual, used all their tricks and swore majestically in an attempt to get it functioning again, but all to no avail. As a result, hydrographic stations and deep-water work were out of the question, and we would have to concentrate on the surface layers.

According to Sir Alister the wide-awake terns of Christmas Island breed every six months. Such a speeded-up reproductive cycle must be supported by an extremely rich food supply, in this case gained from the surface waters of the surrounding sea. The area in the vicinity of the island should be phenominally productive. Here was something we could examine, even with our winches inoperative. Accordingly we chose a more southerly course than originally planned and cruised eastward just a little north of the equator. Hauls at various times of the day and night with different types of gear towed on a long nylon rope kept us supplied with plenty of interesting material. The samples taken at night supplied us with a fair number of deep-sea forms which had approached the surface on their diurnal migration, so the situation was not too bad.

On Wednesday morning, July 21, we reached Christmas Island, which has the greatest land area of any atoll in the world. Its low flat 220 square miles of coral sand supports millions of birds of various kinds, about 300 Gilbertese Islanders who have been brought in to work the large and modern coconut plantation, and one lone European, Mr. Dudley Cook who serves as Resident Commissioner, Plantation Manager, Magistrate, and anything else that may be required of him. He is in fact King, and he rules over Fanning and Washington Islands to the northwest as well. After presenting our papers, having a nice visit at the residency, and inviting Mr. Cook to dinner on board, we returned to the ship, and some of our people went exploring on the coral reefs. That night we had a perfectly fantastic aggregation of swirling animals around our night light. An almost solid sphere of megalops larvae of crabs surrounded the submerged electric globe, and a single unaimed swipe with a small

fine-meshed dip net would bring up a solid cupful. Numerous small fishes were feeding on the larvae, foot-long jacks hung a bit farther out and took the small fishes, while several porpoises cruised back and forth and gobbled an occasional jack. This was the first time we had ever attracted porpoises to the light, and they were doubly interesting since one of the adults was accompanied by a young one about half its length, which swam close to mamma's side and faultlessly matched her every twist and turn. It was a performance worthy of a trained ballet dancer, and a fine show.

Next day diving and fish collecting occupied the morning, while in the afternoon as many as could pile in Mr. Cook's Land Rover visited the tremendous bird rookeries where mile after square mile was covered by literally millions of terns and tropic birds nesting on the ground and frigate birds and boobies in the scattered bushes and small trees. They were so fearless that it was possible to pick up several of them. Of the twelve birds previously reported from the Island, we were able to observe ten, and in addition we saw two more not previously recorded.

An inventory of the fuel situation by the Chief Engineer brought the sad news that we would not be able to do all the work around Christmas Island that we had hoped to if we expected to keep our motors and generators running until we reached Honolulu. As a consequence, on the morning of July 23 we left our anchorage and began a one-day circum-navigation of the island taking hauls with the five-inch phytoplankton net, the one-meter plankton net, and the neuston net at intervals. That night we set our course for Fanning Island where we had been informed that we could get 5000 gallons of fresh water.

At Fanning, a beautiful atoll with a well run coconut plantation of about 2500 acres we were well received by Mr. Philip Palmer, the Manager and only European, who has spent more than 30 years on the island and loves it. The single narrow entrance boasts tidal currents that rival those at Canton Island, and we were not able to get in until about four o'clock Sunday afternoon. Exploring, diving, collecting in the shallows, and partaking of Mr. Palmer's generous hospitality occupied our time pleasantly and profitably enough, but it was a bitter disappointment to learn that instead of the 5000 gallons of fresh water that we had expected, only a little over 500 gallons was available. This bearly improved our critical shortage. On the slack high water of Monday we departed, abandoning all thought of stopping at Palmyra where Dr. Banner, of the University of Hawaii, had requested that we collect specimens of snappers for his studies on fish poisoning. Instead we set sail for Honolulu, forbidding all showers and washing the dishes in salt water.

Work consisted largely of neuston net hauls. This net, fastened to a frame consisting of two water skis, skims the very surface of the water and collects a specialized fauna of blue siphonophores, blue jelly fishes, blue copepods, etc., at least during the day time. On a series of hauls taken every two hours during the night it collected not only flying fishes but lantern fishes and even a deep-sea stomiatoid of the genus Astronesthes. We knew that these organisms approached the surface at night, but had not realized that they were so prevalent in the upper two or three inches that we could

catch them there in numbers. Towed at full speed, the gear took a tremendous beating when the waves were rough. It was damaged a couple of times, and once we almost lost it when it broke loose. On being retrieved we found that one vertical vane had broken, and half of it was missing. The net was patched up and the work continued, but eventually we struck the strong northeast trades and the heavy seas that they induced, and we had to stop the neuston work. However, the winds helped us on our way, and we reached Honolulu on August 2nd, one day ahead of what we had figured, and still with water enough for everyone to take a slight damping down as a substitute for a real streaming shower.

TE VEGA EXPEDITIONS
GENERAL NARRATIVE - INSTALLMENT 24
Dr. Rolf L. Bolin

Honolulu represented return to civilization after long days at sea and brief stops at tiny ports and primitive anchorages. Capt. Darr was greeted by his wife, and Drs. Haderlie and Fry were welcomed by their entire families, including a half dozen children, so that it seemed like quite a homecoming. Visits to the University, the Oceanographic Institute at Sea Life Park, the Marine Station on Coconut Island, the U. S. Bureau of Commercial Fisheries' Tuna Behavior Facility, the Bishop Museum, the Foster Botanical Garden, etc., were interspersed with normal sight seeing and recreation while the ship was being fumigated, serviced and resupplied. Unfortunately one of the students, Michael Laurs, had to be hospitalized for illness and he was lost to us for the rest of the cruise.

On August 10 we set sail once more for some of the southeastern islands of the group to see what Hawaii had to offer. We anchored off Lahaina on Maui, at an isolated anchorage on Lanai, and off Kailua on the Island of Hawaii for diving, collected some fishes and bottom invertebrates, and did neuston work between anchorages, but we came to the conclusion that regions farther south and west are more interesting and spectacular. Perhaps we have been spoiled by seeing the very best.

One feature that did please us was a cave in a small offshore islet off our anchorage at Lanai. This had an entrance at a depth of 50 feet. As one swam through the portal and along the sandy bottom which sloped gently upward the relative brightness outside was replaced by an eerie gloom. At the far end the roof of the cavern was pierced by numerous small holes through which the bright blue water could be seen. The clear cerulean color, accented by the jet black of the framing rock, appeared like a luminous stained-glass rose window in an ancient Gothic cathedral. The cavern provided us with no biological specimens; in fact, it was too dark in there to see anything clearly, but I believe that everyone who entered experienced a spiritual uplift from the sheer beauty of the unexpected spectacle. It is no wonder that the local divers have named the place "The Cathedral."

Off Hawaii we had our first diving accident, a near drowning. One of the students over-exerted himself in snorkeling and lost consciousness under water. It was only owing to the alertness of Bill Gnewuch who saw the student and immediately towed him to the whaleboat, and to the promptness with which Ben Korgen applied mouth-to-mouth respiration while he was still over the gunwale and not yet fully on board that a tragedy was averted. Everyone on board, and especially the near-victim, is extremely grateful to these two students for the magnificent way in which they reacted without delay to an emergency.

On our return to Honolulu on August 17 for further minor repairs and for topping off the fuel and water tanks for the long reach home, we sampled once more the varied things that a big city has

to offer. The final event was a farewell dinner for Sir Alister Hardy at one of the big hotels at Waikiki. Unfortunately, he had to leave us before the end of the cruise in order to attend some important meetings in England, and we lost a valued mentor and a wonderful shipmate and friend.

On August 21 we sailed for home. Trying to avoid the headwinds of the northeast trades, we headed almost due north and then made a great arc to the eastward around the center of the semipermanent east-Pacific high. On the way we encountered a sparse population of Velella, the "by-the-wind-sailor." They had the sails extending from N.W. to S.E., differing in this regard from those that we had taken off San Diego on the outward voyage and being exactly the same as those we collected in the Mozambique Channel between Madagascar and Farica, well south of the equator. They shot down my idea that under the influence of Coroli's force those of the two hemispheres might differ in regard to the angle of their sails.

During this leg of the cruise we took neuston hauls when the weather permitted, but we were in the area of a marine desert known as the East Pacific Barrier where plankton populations are notoriously sparse. As a consequence our catches were poor indeed, and sometimes consisted of nothing more than two or three specimens of the marine water-strider, Halobates. It was not until September 4, when we were only a couple of hundred miles off the coast of central California, that indications of richness were such that we again put a plankton net to a depth of about 30 meters at various crustaceans, including innumerable larval forms, large heteropods, lantern fishes, and many other things. The enriching effect of coastal upwelling could hardly have been better illustrated, since we had become used to haul after haul with practically no catch.

Since the field work on this long passage had yielded so little to keep us busy in the laboratory, the lecture program was stepped up to two a day. Every morning one of the students spent an hour discussing some subject in marine biology, usually in the field of their own research, and a number of them on investigations pursued during this cruise. The general level of quality was extremely high, and we were all pleased. During the afternoons the two remaining faculty members (Haderlie and Bolin) would hold forth.

Throughout the entire cruise we have been making observations of the birds encountered. These have been largely oceanic types. On September 3 we saw our first gull, which meant that the mainland of North America was not too far distant. A check on the chart indicated about 440 miles. The next day a wandering tattler came on board and settled down on top of the laboratory, and later we spotted a phalarope. By the 5th we had seen a warbler, and a song sparrow and a black phoebe had also come on board. About 80 miles out we spotted a butterfly fluttering about. These evidences of the proximity of land was a bit too much, and channel fever spread throughout the entire ship. Periodically people would leave their tasks of cleaning up and packing, and would wander topside and strain their eyes eastward hoping for the first sign of land. At last,

just before 6 o'clock the outline of the Monterey Peninsula became faintly visible through the haze. Gradually the details sharpened, only to be obscured again when the sun dipped behind the western clouds and darkness began to fall. However, at the time Pt. Pinos light began to flash and beckon us in.

Before 8 o'clock TE VEGA was safe in her home port for the first time. She had spent 26 months plowing distant waters; she had tied up in such odd ports as Hellville and Honiara, Mombasa and Mustamudu, Padang and Penang; she had dodged coral reefs at Fakaofu and Fanning Islands, at New Britain and Niuatobutabu, at Vanikoro and Vavau; she had been battered by wind and wave in the Mozambique Channel and the Bay of Bengal, in the South China and the Coral Seas, in the open Pacific and Indian Oceans; she had served as class room, laboratory and home to 84 graduate students and 32 senior scientists who, as they spent 10-week periods delving into the mysteries of the sea first-hand, had used and sometimes abused her to the limit. Now she showed the signs of wear and tear. Still showing the aristocratic lines of the proud luxury yacht that she once was, the scuffs and scars of her battles proclaim her to be a hard-working research vessel. All those who have served aboard her will remember her for a long time.