Alpha Helix comes home

November 22, 1966

An eight-month, 16,500-mile, scientific expedition to Australia's Great Barrier Reef ended Tuesday, November 22, when the University of California, San Diego's Scripps Institution of Oceanography's ocean-going biological laboratory vessel, the Alpha Helix, concluded her maiden voyage and berthed at Scripps' Nimitz Marine Facility, on San Diego Bay.

Organizer of the expedition, Dr. Per F. Scholander, of Scripps, described it as an ambitious international program of experimental biology.

"A total of 44 scientists from 11 United States and eight foreign institutions conducted sophisticated research on tropical mangroves, reef corals, and sea and land animals, said Dr. Scholander, professor of physiology at Scripps and director of its Physiological Research Laboratory.

"Twenty of the participating scientists were from Australia, New Zealand, England, Sweden, and Japan," he said.

"The expedition was conducted as a scientific program in international cooperation that fostered keen professional interest in all phases of the varied research that was carried on.

"Substantial gains in scientific knowledge were made, preliminary reports have been filed by the investigators, and standard scientific journals will be publishing results of their work in the months ahead."

The scientists worked not only in the ship's laboratory, moored in Princess Charlotte Bay, 180 miles north of Cairns, Queensland, but also in two air-conditioned, prefabricated laboratories set up at a shore camp 1,200 feet away on a sand spit on Flinders Island. They stayed on the Barrier Reef for the duration of their particular investigations.

The 300-ton,, 133-foot Alpha Helix sailed from Cairns, October 18; stopped at Apia, Western Samoa, briefly; docked at Honolulu November 10; and left there for San Diego on November 12. All the scientists had returned to their homes before the ship left Cairns.

Master of the Alpha Helix when she left San Diego March 19 for Cairns, was Capt. James Faughn, Cardiff-by-the-Sea, who also was the expedition's program director. On her return trip, Capt. Terry Hansen, San Gabriel, Calif., was ship's master between Cairns and Honolulu, with Capt. Robert B. Haines, 1011 E. Street, Coronado, serving as ship's master from Honolulu to San Diego. During this period, Captain Faughn has been at Scripps Institution planning Scripps' forthcoming Amazon River expedition.

Of the 13 crew members who sailed to Australia, six were with the vessel for the entire voyage. They were: Michael Mehling; Morris E. Horn, of El Cajon; Ronald McConnaughey, of La Jolla; Frank P. Dailey; Howard R. West; and Terrell Davis. Haines was with the ship seven of the eight months she was away.

All crew members will be guests at a dinner December 6 at Sea World.

Scientists from Scripps and UCSD's Revelle College and School of Medicine who conducted research during the expedition included, besides Dr. Scholander, Drs. A. A. Benson, T. H. Bullock, Robert H. Elsner, Susumu Hagiwara, Francis T. Haxo, Martin Kamen, Stanley Miller, Donald W. Rains, and Kunitaro Takahashi. Three Scripps graduate students, Dennis Hafemann, R. W. Piddington, and Morgan Wells, conducted investigations.

The scientists represented the interdisciplinary fields of biochemistry, biophysics, physiology, plant physiology, chemistry, physics, and neurophysiology.

Scripps and Revelle College personnel serving as laboratory technicians and assistants were Edda Dee Bradstreet, Peggy McNally, Henk DeKlerk, William Eaton, Ted Hammond, and Bent Schmidt-Nielsen.

The expedition, designated Billabong - an Australian term for waterhole - was funded by the National Science Foundation (NSF), which is also sponsoring Scripps' extended experimental biological and physiological investigations in the Amazon between January 15 and December 15, 1967. The Alpha Helix and a shore camp again will provide laboratory facilities for a wide variety of research work.

Dr. Scholander said the Barrier Reef operation of the Alpha Helix fully justified the faith placed in her by Scripps' designers and NSF officials. NSF provided funds to build the vessel and for the expedition.

"We don't plan to change the ship's interior arrangements," said Dr. Scholander. "She's a successful sea-going laboratory. An example of her capability as a stable work platform is illustrated by the fact that intracellular electrodes - tiny wires placed in leaf and animal cells could be maintained functionally for hours, something very difficult to do in any lab.

"So far, the scientific work is more apt to be limited by the wits and ingenuity of the investigators than by its physical equipment and the layout of the lab."

Dr. Scholander reported these research highlights of the expedition:

Studies of salt water secretion in mangroves and research into reverse osmosis and its relation to the desalination process in mangroves. It was learned that a new compound, choline sulphate, is highly concentrated in salt-secreting mangroves and that the sulphate helps to move the salt through the permeable mangrove cells.

Studies of the up-take of sodium and potassium in mangrove leaves. It was found that the mangrove follows the pattern of non-salt tolerating plants, such as barley and other common agricultural plants.

Investigations into the symbiosis of growth and metabolism of reef corals and a study of how symbiotic algae grow in their tissues. Symbiotic algae are single-celled plants that live in all reef corals. It was found that the algae li1berated carbohydrates, which furnished the animal with energy that could favorably influence the growth of reef corals.

Research into the mechanisms that conserve heat in aquatic mammals, as exemplified by the peculiar vascular arrangement in the dugong, a sea cow, whose blood supply to the tail consists of several hundred arteries and veins together in one bundle which presumably acts as a heat exchanger. He said a similar system exists in the human kidney.

Studies of corals, mud crabs, and giant clams - the latter vary in size up to three to four feet in length and weigh 600 pounds - to learn how their nerve mechanisms function. The muscular strength of the giant clams also was measured by placing a pressure capsule between the lips of the clam shell and recording by a pressure gauge the full closing force of the clam. For example, it was determined that a clam weighing about 220 pounds can exert a tension of as great as 660 pounds. The ship's winch and up to 880 pounds were required to open the clam's shell, the latter being the equivalent of the weight of five men.

The first motion picture filming of nerve excitation in coral nerve nets was made in reef coral studies. Research into the isolation and cultivation of photosynthetic bacteria from both fresh and salt water swamps. These bacteria convert atmospheric constituents and soil compounds into organic matter with sunlight as the energy source, in a fashion similar to green plants.

Research into the action of cell membranes by study of giant, single-celled algae.

Studies of the nature of body temperature regulation in lizards.

Investigations into how the Australian mud skipper fish can spend lengthy periods on land breathing air.

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