

ALPHA HELIX expedition (Cairns, Australia)

June 30, 1966

CAIRNS, No. Queensland, Australia, June 30 (Aboard Alpha Helix) --- Scientists from four nations are studying the problems of salt movements in plants and animals in investigations under way off the Great Barrier Reef, 200 miles north of here and some 800 miles south of the Equator.

They are extending man's knowledge of salt metabolism in trying to understand the function of the tiny membranes contained in all living cells.

Their research is the work of the Billabong Biological Expedition of the University of California, San Diego's Scripps Institution of Oceanography.

Taking part in an eight-months' investigation are chemists and biochemists; physiologists, plant physiologists, and neurophysiologists; physicists and biophysicists; and men of medicine.

They have come from Australia, the United States, Japan, and England to study the rich plant and animal life in the Flinders Island group, near Princess Charlotte Bay.

Dr. Per F. Scholander, professor of physiology and director of Scripps Institution's Physiological Research Laboratory, organized the expedition. It functions under a grant from the National Science Foundation, which funded design and construction of the Alpha Helix, nerve center of the expedition.

The scientists operate from the, Alpha Helix, Scripps' new, 133-foot, sea-going, experimental biological laboratory. She is anchored 1,200 feet off Flinders Island where, on a spit of land, ("Botany Spit," the researchers have named it), two 8x12-foot, prefabricated, air-conditioned laboratories have enlarged the space and research capacity of the expedition.

Scientists live aboard the vessel and in two, six-man tents near the shore laboratories. A tented mess hall and stores area complete the facilities, serviced with electrical power by cable from the ship. Two launches and several smaller motor boats help solve transportation problems between ship and shore, and an intercommunications system operates between ship and shore laboratories.

Capt. James Faughn, master of the Alpha Helix, is the expedition's program director, and Vince Vlasoff, of Cairns, operator of the Green Island Underwater Observatory, 17 miles off Cairns, manages shore facilities.

"Since problems related to salt metabolism are so varied that scientists trained in many fields have begun to attack them from many directions, we have gathered here men from many scientific disciplines for investigation in a geographical area having plants and animals that offer unique avenues for study of this basic problem of modern biology," Dr. Scholander said.

He explained that salt movements mediate almost all functions of plants and animals, from kidney functions and plant nutrition to the conduction of nerve impulses in animals and the maintenance of freshness in green leaves and fruits.

"How the cell membranes move or 'pump' these salts is not clearly understood," he said. "This marine environment with its plants and animals that have learned to cope with their 'salt problem' will offer us important ideas and solutions to our own problems, which become increasingly acute as we are forced to live and carry on agriculture in saltier water.

"Medical men are also acutely aware of the importance of salt balance for the efficient functioning of the body. To understand this is to understand man himself.

"Our research here is experimental and basic in nature. This area, with its tropical, salt-secreting mangrove trees and coral-reef organisms, is ideal for our investigations.

"So, why are we here? Everyone knows that calcium is a most important salt, the basis for bone, teeth, and shell growth. The marine plants and animals have built the extensive, 1,200-mile Great Barrier Reef of calcium.

"Scientists ashore and aboard the Alpha Helix hope to unravel some of the mysteries of calcium accumulation from sea water and its deposition in algae, shells, and corals.

"These tropical animals are so active in concentrating calcium that the scientists anticipate effective experiments with radioactive calcium in the brief experimental program being carried on."

Dr. Scholander said that radioisotopes are important tools in studying the metabolism of salts, the photosynthesis of plants, and the movement of substances in animals.

"With the generous cooperation of the Australian Atomic Energy Commission and the Queensland Public Health Department, the expedition has utilized every advantage of radioactive tracers in its research."

Dr. Scholander, who began studying the mangrove in 1960 in Australia's Cape York area and later off La Paz, Baja California, uses one of the shore labs for his research. He lives ashore and loves every minute of it. His favorite expression, as he scans the Pacific and the adjacent islands, "Isn't this a grand place?"

In discussing the mangrove, he pointed out that mangroves draw fresh water through their extensive root systems buried in the salt water of tropical shores.

"We now know that mangrove cell membranes admit fresh water to feed the plants yet at the same time prevent salts from permeating the plants," he explained.

Dr. Scholander has shown that microscopic ducts in mangroves carry water under great tension. He is measuring this tension and can destroy it by freezing it with Dry Ice or damaging the membranes with chloroform.

"We have been pleased and honored to have with us, working on problems of mangrove salt glands, Dr. R. N. Robertson and Dr. C. B. Hope, both of the University of Sydney, and Dr. Geoffrey Findlay, of the Flinders University of South Australia," Dr. Scholander said.

Biochemical investigators of mangroves also are under way by Dr. A. A. Benson, associate director of Scripps Institution and head of its department and division of marine biology, and Dr. D. W. Rains, post-doctoral fellow at Scripps; Dr. Emanuel Epstein, professor of plant physiology, University of California, Davis; Dr. Robert S. Bandurski, professor of plant physiology at Michigan State University, East Lansing, and vice president, American Society of Plant Physiologists; and Dr. Stanley Miller, associate professor of chemistry at UCSD.

Dr. Leonard Muscatine, assistant professor of zoology at the University of California, Los Angeles; Dr. William Burke, department of physiology, University of Sydney; and Dr. Donald Maynard, department of zoology, University of Michigan, Ann Arbor, are investigating the salt problem as it pertains to marine animals.

Dr. T. H. Bullock, chairman of the Alpha Helix national advisory board and professor of neurosciences in UCSD's School of Medicine's department of neurosciences; Drs. Susumu Hagiwara and K. Takahashi, respectively head of Scripps' Neurobiology Facility and assistant research zoologist; and Dr. R. W. Rodieck, University of Sydney, have been investigating the mechanism of nerve action in corals, crabs, and snakes, and of the nerve nets in coral, all these phenomena being biological expressions of the movement of ions in the membranes of nerve and muscle cells.

Edda D. Bradstreet and Peggy McNally, of Scripps Institution are laboratory technicians aboard the ship and ashore.

Graduate students working in the expedition include Dennis Rafemann, of UCSD; Michael Dennis, Stanford University, Palo Alto, Calif.; Robert Piddington, UCLA; and Keith West and Hugh Sadler, both of the University of Adelaide.

Two additional programs of research will be undertaken about mid-July and continue until the expedition departs for home in October.

Dr. T. F. Haxo, Scripps professor of biology, will head up investigations in the metabolism and growth of coral-reef organisms. This involves studies of photosynthesis, nutrition, and calcification in plant-animal associations, such as coral and giant clams.

Investigations of heat and osmosis-regulation in reptiles and dugong, the latter an aquatic, plant-eating animal, will be undertaken in research headed by Dr. T. H. Hammel, of Yale University's John B. Pierce Foundation.

Scientists from Australia who will join the expedition shortly include Dr. O. Ross Johnson, Division of Land Research and Regional Survey, and Dr. J. I. Hubbard, Australian National University, both of Canberra; and Drs. Michael Pitman, D. Hugh LeMessurier, and R. F. Whelan, all of the University of Adelaide.

Also coming aboard soon will be Dr. Robert Abrams, of Yale's Pierce Foundation; Dr. Martin Kamen, head of UCSD's chemistry department; Dr. Lawrence Blinks, Hopkins Marine Station, Stanford University, Pacific Grove, Calif.; Dr. T. F. Goreau, University of the West Indies, Jamaica; Dr. George Laties, of UCLA's botany department; and Dr. Fred Caldwell, department of medicine, Syracuse University, Syracuse, N. Y.

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