

Alpha Helix (ship) sails for the Amazon

February 1, 1967

A six-nation, nine-months', extended exercise in modern experimental biology centering in the wild, rich, tropical jungles and rain forests of Brazil's mighty river, the Amazon, gets under way here Friday (February 3).

The Alpha Helix, experimental biological laboratory ship of the University of California, San Diego's Scripps Institution of Oceanography, sails from San Diego and Scripps' Nimitz Marine Facility for her second major scientific investigation in two years.

Master of the vessel will be Capt. James Faughn, Cardiff-by-the-Sea. She will return after covering an estimated 19,000 miles.

Some 40 scientists will participate in the five areas of scientific investigations of the expedition, which is being funded by the National Science Foundation (NSF). They will represent Brazil, co-host for the expedition; the United States, Germany, France, Great Britain, and Norway.

Expedition's principal investigator is Dr. Per F. Scholander, professor of physiology at Scripps Institution and director of its Physiological Research Laboratory, who also coordinated the Alpha Helix's Billabong Expedition to Australia's Great Barrier Reef last year.

The 3,900-mile Amazon, world's mightiest flow of fresh water, drains, with its tributaries, 2,700,000 square miles of South America, including some of the largest and richest unexplored areas on earth.

"The Amazon basin is extremely rich in unique animals, and this expedition will be a true exercise in modern experimental biology whose investigations will contrast with those studies that went on in 1966 in the desert environment of the Barrier Reef," Dr. Scholander said.

"The Amazon will give us a striking, tropical, rain-forest and freshwater environment and provide many peculiar species offering scientists special advantages because of the numerous kinds of physiological investigations they will be able to carry out on basic principles related to human biology and organisms."

Dr. Scholander is hopeful that in 1968, after a year in the dry tropics and one in the wet tropics, scientists will be able to work aboard the Alpha Helix in the frigid waters of the Arctic Ocean and the Bering Sea, studying warm- and cold-blooded animals, problems related to freezing, and in other areas, for example, atherosclerosis in migrating salmon.

"Any correlation between the three expeditions should become evident as the scientists compare the results of their studies in three such divergent areas of the world, he said.

Dr. Scholander outlined the research areas, scientific leaders, and dates for the Amazon Expedition, whose operational base will be the Alpha Helix, anchored in a remote area well upstream from Manaus, 1,000 miles up the river from the Atlantic seacoast city of Belem:

Neurobiology, March 1-May 15, Dr. Theodore H. Bullock, of the University of California, San Diego; osmotic regulation, May 15-July 1, Dr. Knut Schmidt-Nielsen, Duke University; insect physiology, July 1-Aug. 15, Dr. Carroll M. Williams, Harvard University; plant physiology, Aug. 15-Oct. 1, Dr. Jacob Biale, University of California, Los Angeles; and deep sea physiology, en route home, off the Galapagos Islands, Nov. 15-Dec. 1, Dr. Malcolm Gordon, UCLA.

The Alpha Helix is expected to dock at Manaus about the second week of March.

Although most of the research will be carried on in the air-conditioned laboratories of the 133-foot, 300-ton Alpha Helix, the investigators will also work from two prefabricated, air-conditioned, 8x14-foot shore laboratories similar to those used during the Great Barrier Reef expedition. In addition, small-powered boats and a single-engine amphibian airplane will extend considerably their operating range.

The expedition will initially operate in the region of the confluence of the Rio Negro and Rio Branco Rivers, some 200 miles above Manaus.

A wide range of animals awaits the investigators: fresh water sharks and rays, electrical fishes, echo-ranging dolphins; the great water snake, the anaconda; the blood-smelling piranha fish; the largest of fresh water fish, the arapaima; lungfish, cayman, flying fish that vibrate their fins, ultrasonic bats, and insects.

Of importance to Brazil's developing economy is the program for the plant physiologists, parts of which will overlap with research to be conducted by the Brazilian scientists, for example, in the cellular and chemical processes related to the ripening of fruit.

"Mainly, however, our chief investigations will be in the realm of pure science, but where possible, upon organisms of human value, as we try to blur the line between pure and practical science, in order to try to help the Brazilians in any way we can," Dr. Bullock emphasized. He is professor of neuroscience at UCSD and chairman of the National Advisory Board that helps map the work of the, Alpha Helix.

"The Alpha Helix, actually a national facility for use by all scientists, will be an ideal floating platform for the highly sophisticated work to be done in taking advantage of the biological riches that await us in the Amazon," Dr. Bullock said.

"These riches aren't to be measured like specimens in a museum; instead our studies of them will tell us how animals and plants work. In this we feel we are turning a biological 'corner,' as it were, in bringing the laboratory to the place where the specially favorable species live."

Specifically, the 15 scientists working with Dr. Bullock will conduct experimental studies on the brain, sense organs, muscles, and behavior of various species of fish, rays, dolphins, bats, reptiles, and insects. They will give particular attention to the electroreceptors of the electric fish and fresh water rays and to the brain mechanisms that process information from the receptors.

They will study the sounds produced by the river dolphin and by tropical insects; and the infrared sense organs in snakes, particularly boa constrictors; the behavior of piranhas and flying fish and the basis of slothfulness in the sloth.

Scientists with Dr. Schmidt-Nielsen will study the physiology of the salt and water in animals as they pertain to osmotic regulation, the diffusion that proceeds through a semipermeable membrane in living cells. They will study oxygen and carbon dioxide influence on respiration, circulation, and the heart, and their measurement levels in the blood, arterio-venous differences, and accessory air breathing.

All classes of vertebrates will be used in these studies, including lungfish, sidenecked turtles, birds, aquatic mammals, and the coecilia, or apodans, animals without legs or fins.

Dr. Williams and his colleagues will take advantage of the special insect fauna of the Amazon and its associated flora, especially certain tree species. Some will study the general physiology and hormone regulation of insects; others the trace substances produced by trees that act to suppress their specific insect pests. Insect control by natural hormones is one of the objectives of the research.

Working with Dr. Biale, the plant physiologists will investigate the respiratory mechanisms in Amazonian cultivated fruits and selected indigenous fruit. It is in this area that effective mechanisms for ripening, handling, and storage of potentially commercial fruit crops can be worked out.

This group will also study the causes of guttation, a phenomenon in which leaves of jungle trees secrete moisture. Gas and water transport (reverse osmosis) in the great Victoria reg and flooded forest trees will also be considered.

Her Amazon assignment ended, the Alpha Helix will detour, en route home, southward from Panama to permit Dr. Gordon to study the physiology of deep sea fishes in the Galapagos Island region. This deep sea work would also provide needed ship experience leading to the proposed 1968 Arctic Ocean-Bering Sea Expedition.

Organizations participating in the Amazon Expedition included, at sailing time, the University of California at San Diego and Los Angeles, the Universities-of Colorado, Washington, and Pennsylvania; the University of Frankfurt, Germany; the Pasteur Institute, Paris; the French National Research Council; Rockefeller University; Oxford University, England; the University of Oslo, Norway; the University of Sao Paulo, Brazil; Harvard University, Duke University, University of Leeds, England; Cornell University, Western Reserve University, Woods Hole Oceanographic Institution, Louisiana State University, and Iowa State University.