Alpha Helix departs for Bering Sea

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How arctic fishes and mammals survive their frigid environment and why spawning salmon suffer from atherosclerosis will form the bases of intensive studies in a research expedition that began today (Friday, February 9) with the departure for the Bering Sea of the Alpha Helix, Scripps Institution of Oceanography's experimental biological laboratory vessel.

Between early March and late September, some 50 scientists from five nations will participate in a four-part research program funded by grants totaling $574,000 from the National Science Foundation.

With the Alpha Helix as home base, the investigators will work in the vicinity of Nunivak and St. Lawrence Islands, in the Bering Sea; in the Bering Strait and north of the Arctic Circle toward Pt. Hope; in the vicinity of Juneau, Alaska; and, for the salmon studies, at Bella Coola, British Columbia, on the Bella Coola River.

Announcing the Bering Sea Expedition, Dr. William A. Nierenberg, director of Scripps, said this marks the third major expedition for the Alpha Helix in three years.

"The ship worked in the dry tropics of Australia's Great Barrier Reef in 1966 and in the wet tropics of the Upper Amazon last year," he said. "This expedition will provide her an opportunity to test her versatility by operating in a polar sea."

The 133-foot, 300-ton Alpha Helix will log some 7,800 miles before putting in to home port next October 10.

As he was for the Barrier Reef and Amazon Expeditions, the principal investigator for the Bering Sea Expedition is Dr. Per F. Scholander, professor of physiology at Scripps and director of its Physiological Research Laboratory.

Dr. Scholander will be senior scientist for the expedition's first research program; Dr. Kjell Johanson, University of Washington, for the second; Dr. C. Ladd Prosser, University of Illinois, the third program; and Dr. Andrew A. Benson, professor of marine biology at Scripps and chairman of the Division of Marine Biology, for the fourth program.

Capt. Terry Hansen will be master of the Alpha Helix for the first half of the expedition and Capt. Robert Haines will meet the ship at Dutch Harbor, Alaska, for the return voyage.

En route to Dutch Harbor, where Dr. Scholander will join the vessel in early March, she will take aboard two pilots for the circuitous journey from Port Angeles, Wash., through the Inside Passage to Juneau.

Upon leaving Dutch Harbor for the Nunivak-St. Lawrence Island area, the U.S. Coast Guard icebreaker Northwind will lead the Alpha Helix through the ice pack. Northwind is based in Seattle.

At Nunivak Island, the scientists will work in laboratories of the Alpha Helix and the Northwind, and in a U.S. Bureau of Indian Affairs laboratory at Mekoryuk. The Northwind will be equipped with two helicopters to facilitate

personnel transportation in the area. This part of the expedition is a joint undertaking between Scripps and the University of Alaska with Dr. Laurence Irving as senior scientist.

The Northwind will remain with the Alpha Helix until mid-April and return to Seattle. Alpha Helix will then slowly proceed through the drifting ice northward to the Bering Strait and beyond the Arctic Circle toward Pt. Hope. She will head back to Dutch Harbor for re-fueling and re-provisioning in time to sail on to Juneau by July 7.

After working in the Juneau area and at Bella Coola, the ship will depart for San Diego about September 30.

One reason for the Bering Sea Expedition, Dr. Scholander says, is to determine how practical it is to conduct scientific biological and physiological research in that area, utilizing the shelter of the floating ice to obtain a steady laboratory.

In addition, of course, is the keen interest in learning about ice propagation in animals and plants.

"We want to know more about the defense mechanism that fishes have against the interior freezing of their bodies," said Dr. Scholander. "They have some sort of an inbred anti-freeze, probably combined with some unknown physical mechanism.

"In arctic marine mammals, the flukes are ice-cold but the rest of their body is warm. How can they conserve body heat under such conditions?

"We also know that in some mammals, the nerves function both inside the warm body and in the cold extremities equally well. The conduction in nerves inside is warm but the cold periphery of the nerve functions very well. Why is this?

"During the expedition, the scientists will be working with sea birds, walruses, seals, otter, reindeer, eel pouts, crabs, musk ox and other animals.

"We'll study the respiratory efficiency of gills and microcirculation of fishes living in this frigid environment. We hope to learn how the tissues of a reindeer's antlers grow under such cold conditions. Why are we and Eskimos so sensitive to snowblindness, when arctic mammals and birds are not?"

Commenting upon the salmon research at Bella Coola, Dr. Benson said that as the spawning salmon swims from the ocean into and up fresh-water streams, the walls of the arteries leading to the heart muscle become thicker, thus reducing circulation to the heart and starving it of oxygen.

"The same situation occurs in human beings suffering from atherosclerosis," he said.

"We will study the biochemical and physiological situations in the salmon that are analagous to those in human beings. At this point, no one knows why the walls thicken. We hope our study will help provide some answers."

He said salmon from the ocean and from fresh water will be studied, but that there will be no tagging or attempt made to study the same fish in both environments for lack of time and because studies of this nature are being conducted by the Fisheries Research Board of Canada.

Several scientists in the Benson party have done extensive studies with human patients having atherosclerosis and they will be seeking similar conditions in the salmon, Dr. Benson said.

In the spawning situation, the salmon is under stress, Dr. Benson explained. There is a relationship between stress and atherosclerosis, so that the salmon will be studied for the biochemical and physiological changes that occur under stress. There is indication that similar changes occur in human beings.

In this connection, Dr. Benson said that stress involves the liberation of fats, such as phospholipids and cholesterol, into the blood, where they circulate and settle out in various places, such as the fatty plaques which accumulate on the walls of the aorta in a human being.

"As far as we know, a salmon doesn't develop this problem," Dr. Benson said. ."In the salmon, the cholesterol is kept in solution in the blood and not allowed to attach itself to arterial walls. Our studies will include analysis of the lipid content in the blood for indications of how this condition might differ in the salmon."

Members of the Fisheries Research Board of Canada will work with expedition scientists in the salmon studies, which will be made aboard the Alpha Helix.

In related salmon studies, Dr. Walter Carey of Scripps' Physiological Research Laboratory and his colleagues will work at a shore camp 40 miles up river from the Alpha Helix, studying the rate of blood circulation in salmon and measuring the amount of blood passing through the heart of a normal salmon and in one that is degenerating after having spawned.

A brief resume of the four research programs, their dates, and fields of study follows:

March 10-April 30, Nunivak-St. Lawrence Island area -- Studies of the temperature sensitivity of fishes; the adaptation to cooling in the peripheral nerves of birds, walruses, and seals, and the development of peripheral heat regulation in seal and walrus pups; studies of the physical chemistry of freezing and the protection against freezing in super-cooled bottom fish and super-osmotic surface fish; studies of how arctic animals protect themselves against snowblindness, to which human beings are susceptible; and studies of photosynthesis under the ice.

May 1-June 30, Nunivak and St. Lawrence Island area -- Studies of the circulation through the extremities of seals and walruses and through the growing antlers of reindeer; studies of gas exchanges and circulation in fishes and larger invertebrates living at near-freezing water temperatures; studies of free-diving seals and sea otters.

July 8-August 16, vicinity of Juneau -- Studies on temperature dependence of the reflexes in cold-water fish and research in the chemical aspects of enzymes in cold-water animals and plants.

August 16-September 30, Bella Coola, British Columbia -- Studies of spawning salmon to determine causes for the thickening of arterial walls leading to the heart muscle and to learn about the biochemical and physiological changes that occur in salmon under stress conditions, in which there is an indication that like changes occur in human beings.

Some 25 organizations will be represented among the scientists, graduate students, and technicians participating in the expedition. Each research program will have different personnel at work.

The organizations include, besides Scripps Institution of Oceanography of the University of California at San Diego, Scripps Clinic and Research Foundation, La Jolla; the Universities of California (Los Angeles), Alaska, Southern California, Southern Mississippi, Oslo, Jerusalem, Toronto, Illinois, and British Columbia; Harvard, Johns Hopkins, and Pennsylvania State Universities; the Pasteur Institute, Paris; the Alaska Department of Fish and Game; the Arctic Health Research Laboratory of the University of Alaska, the Harvard School of Public Health, the U.S. Bureau of Commercial Fisheries and the Firland Sanatorium, both of Seattle; and the Fisheries Research Board of Canada at Vancouver and Nanaimo.