Alpha Helix Program Administrative History

Carolyn Rainey, Scripps Archives. February 1985

The research vessel Alpha Helix was a National Oceanographic Facility of the University-National Oceanographic Laboratory System (UNOLS) for experimental biology, owned and operated by the Scripps Institution of Oceanography, University of California, San Diego, from February 1966 to August 1980. It is funded and sponsored by the National Science Foundation and scheduled by UNOLS. The concept for the vessel was proposed to Scripps Institution in 1958 by Per F. Scholander, a distinguished physiologist and director of Scripps Institution of Oceanography's Physiological Research Laboratory from 1963-1970. Scholander concluded that many fundamental biological problems could best be investigated by teams of competent scientists supported by the advanced technology and equipment of a floating laboratory. The ship was proposed by Scholander and supported by a grant from the National Science Foundation in 1962.

In response to a proposal (UCSD 963) of May 22, 1961, the National Science Foundation grant F-24831 was awarded by letters of June 30, 1962, August 22, 1963, and August 5, 1964 to the Regents of the University of California for support of the Construction and Operation of Biological Laboratory Ship and Associated Shore Facility. This project is under the direction of P. F. Scholander, Division of Marine Biology, Scripps Institution of Oceanography, San Diego. The sum $1,481,155 included in this grant paid for the construction and equipping of the R/V Alpha Helix. The only statement of the mission of the ship in the granting instruments is the following, from Director Alan T. Waterman's letter of June 30, 1962, to President Clark Kerr:

> The grantee shall use the ship primarily for the conduct of basic scientific research and shall not dispose of the ship without prior approval of the Foundation. It can therefore be assumed that the mission as it is more fully stated in the proposal is the historic basis of the ship's function. Scholander's proposal stated:
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> The prime objective of this proposal is the creation of a unique facility for experimental studies of organisms associated with the oceanic environment. Its focal point is a laboratory ship with supporting home based laboratories and technical facilities which would provide experimental biologists, both here and abroad, with the opportunity to apply their wits and various skills to the many tasks which can be handled only by a well equipped laboratory on the site of the natural habitat.[1]

Scripps Institution of Oceanography was authorized to run the entire Alpha Helix program, exercising the role of a National Science Foundation research project office, appointing a peer review committee, selecting cruise participants, and dispersing National Science Foundation funds to those participants. In 1973, the vessel was designated within the University-National Oceanographic Laboratory System (UNOLS) a National Oceanographic Facility (NOF) by means of a three way agreement among UNOLS, National Science Foundation and Scripps Institution of Oceanography. At this time, the distribution of responsibilities shifted. The designation as a National Oceanographic Facility was no real change for R/V Alpha Helix which had been serving as a national facility since its inception, but rather it recognized the ship's role within the UNOLS framework.

Operationally, R/V Alpha Helix was part of the research fleet of SIO, maintained and operated by the Marine Facilities Division and managed through the Ships Operations and Marine Technical Support Division. Ship operating costs were distributed in accordance with the approved fleet allocation formula and support for Alpha Helix operations was included in grants, contracts, and other agreements for support of the SIO fleet.

R/V Alpha Helix was dedicated to the quest for biological and medical knowledge and her name honors the discovery of the helical structure of protein molecules and of the genetic material, DNA.[2] The vessel was designed by L. R. Glosten and Associates of Seattle, Washington, and built by the Martinac Ship Building Corporation of Tacoma. She was launched on June 29, 1965, delivered to the Scripps Institution of Oceanography in February 1966, and sailed the following month for a one-half year program at the Great Barrier Reef of Australia. R/V Alpha Helix is 133 feet long with a 31 foot beam and a displacement of 512 tons. The ship carries a crew of 12 and can berth a scientific party of ten. The three laboratories are air-conditioned and well equipped with many laboratory instruments. There is a walk in freezer, a dark room, machine shop and other facilities. Charles B. Sibley said,

The unique advantage of the Alpha Helix is that its research facilities bring areas of exceptional biological interest into direct contact with modern laboratories. For our program this is a particular advantage because many proteins become altered (denatured) to some degree even when stored at very low temperatures. To be able to compare absolutely fresh material from many species is a rare and welcome opportunity.[3]

The National Advisory Board of the Alpha Helix program was inaugurated by Roger R. Revelle in consultation with the National Science Foundation in 1964, with A. Baird Hastings as its first chairman. The board was composed of eminent scientists from various American institutions. Each appointment was made by the director of Scripps Institution of Oceanography in consultation with the National Science Foundation. Originally it consisted of physiologists and biochemists, however, in 1970 half of its members were biological oceanographers. The function of the board was to assure that the ship was utilized according to the highest national and scientific standards. These standards were upheld through policy-making, assisting and reviewing proposals for use of R/V Alpha Helix, overseeing the operations of the vessel, and making recommendations to the director at Scripps Institution of Oceanography. Walter F. Garey said,

> The Alpha Helix Program comprises one of the most imaginative and productive research efforts of the United States. Professor Per Scholander conceived the Alpha Helix as providing a milieu in which teams of recognized international scientists could live together as they attacked fundamental biomedical problems. The guiding philosophy of the National Advisory Board of the Alpha Helix has always embraced this precept and implemented it whenever possible.[4]

The board selected the general area of operations each year and solicited proposals for specific programs of research. A chief scientist who recruited scientific participants for the projected studies was appointed for each program. Usually three or four consecutive expeditions were carried out each year with required field operations of three months per expedition. Three consecutive expeditions took place on R/V Alpha Helix during 1969-1970. The expeditions were identified by letters from the alphabet, and the programs were listed numerically. The expeditions started with New Guinea, 1969; Guadalupe Island, Mexico, 1970, and the Eastern Pacific, 1970. The Eastern Pacific Expedition consisted of six separate programs with a chief scientist heading each program. For instance, Chief Scientist William A. Dunson was on the fourth leg of the expedition, which started from San Diego en route to Panama. Programs were conceived in terms of fairly broad subject areas of experimental biology to promote interaction among participants and facilitate technical preparations for specialized equipment. The field report title was “Physiological Ecology of the Sea Snake Pelamis platurus.” This report included studies of the mechanisms of tolerance of the sea snake Pelamis to changing temperature and salinity including studies of the newly discovered salt gland. Also examined were oceanographic factors that limit the movement of the snakes along the coast and reproduction and population dynamics. The sea snakes are poisonous, sea going relatives of the cobras. Although they are inoffensive, there was a justified fear that these snakes might colonize the Atlantic Ocean through the proposed Central American sea level canal. Little was known about the biology of the sea snakes and their habits were of great interest because these snakes are the most pelagic and most successful group of marine reptiles. Several important discoveries relating to the interaction of this sea snake with environmental factors such as temperature, salinity and current were made. The measurement of the very low upper lethal temperature for Pelamis would be used as a strong argument in favor of construction of a thermal barrier in the sea level canal.

Each member of the expedition was requested to write an abstract of their scientific accomplishments before leaving the ship. On return of the expedition, these abstracts were duplicated by the program office and submitted to the National Advisory Board, the National Science Foundation, and to the institutions involved in the host country. The final scientific papers were published in journals of the author's choice. The papers included a statement of affiliation with the relevant Alpha Helix expedition and acknowledged NSF support. They were bound into expedition volumes, one set kept on board R/V Alpha Helix library.

The general grant from the National Science Foundation was divided into two parts, a larger one for operation of the ship and a smaller one for operation of the scientific program. These were sharply separated. The ship operation grant covered expenses of the vessel. The scientific grant was largely used for scientific travel from home laboratory to ship and return, expenses like shipping scientific equipment and supplies, equipping the ship's laboratories, and support of the administrative personnel in La Jolla.

Scientific direction and requests for appropriate utilization of R/V Alpha Helix was provided with evaluation by the Alpha Helix Review Committee (AHRC). The Alpha Helix Review Committee members were appointed by UNOLS and acted for UNOLS making recommendations to SIO and keeping the National Science Foundation advised regarding these recommendations. Membership consisted of seven scientists, one scientist from Scripps Institution. Their responsibilities were to assure scientific quality and suitability of the projects, determine source and amount of support for the research program, with first preference given to National Science Foundation funded projects, select potential areas for cruises with consideration of the work proposed, determine geographic compatibility of the project with other competitive programs and oversee scheduling and operations with overall scientific merit foremost. Preliminary research proposals written by scientists were submitted to the Alpha Helix Review Committee two and a half years before the starting date for a major expedition. The committee named chief scientists and their alternates, arranged pre-cruise workshops and

approved and disapproved proposals for projected cruises. Alpha Helix Review Committee member Vera Alexander concluded,

> In looking ahead we can offer no better recommendation than to urge the continuance of and adherence to the current Guidelines for Management Oversight of R/V Alpha Helix Program. We feel that these guidelines which were the result of a great deal of effort by your staff, our Committee and the National Science Foundation offer the best means of operating the Alpha Helix as a uniquely valuable facility for the entire scientific community.[5]

The Alpha Helix Program Management Office (PMO) was established by Scripps Institution and provided administrative logistical support and shipboard continuity for the laboratory researchers who used the ship, participated in cruise planning and coordinated operational and budgetary requirements with other SIO operations staff and provided general staff support to UNOLS and AHRC in all matters pertaining to the Alpha Helix program. The PMO provided information and advice to researchers preparing preliminary proposals to AHRC or project support proposals to funding agencies, maintained the accounts of ship time, equipment, applications and safety requirements. The PMO provided the associate director and Marine Facilities Division (MARFAC) with budget estimates and justification for the support proposal for PMO. The Program Management Office in conjunction with the Alpha Helix Review Committee arranged for pre-cruise conferences involving the prospective scientists. During and following a cruise the PMO ensured that reporting, specimen and data sharing and publication commitments were met. The PMO staff received general supervision and guidance from the SIO associate director, and kept that office informed, on a regular basis, of its activities. The staff was expected to carry out the functions of the PMO with minimal specific supervision and to have knowledge of institutional procedures and policy sufficient to represent SIO in day to day non-policy dealings with UNOLS and the AHRC, scientists, ship users and funding agencies. Support for the PMO staff and administrative costs were provided largely from a grant from the Office for Oceanographic Facilities and Support (OFS) of the National Science Foundation.

The PMO staff consisted of one administrative assistant and two marine technicians who reported to the program manager. The administrative assistants who worked for the Alpha Helix Program Management Office were Joan Murry, from September 1972 to 1976; Diane Homiston Miller Bissonette, from December 1976 to July 1978 and Vanessa Wilds Cunningham from September 1978 to March 1980. The marine technicians that worked on R/V Alpha Helix were Walter W. Schneider, from December 1971 to June 1976; Tom F. Forhan, from March 1973 to January 1979; Dennis Michael Popp, from July 1976 to March 1980 and John Thomas Boaz, from January 1977 to May 1980. Also, Alexander Frances Strickland worked as a staff volunteer from 1978 to 1979.

Walter F. Garey was appointed by the director of Scripps Institution of Oceanography to be the program manager of the Program Management Office. He served in this capacity from August 1970 to September 1976. He worked part time as a physiologist at Scripps. When he resigned his duties at the PMO, Robert L. Fisher, associate director of SIO and head of Ship Operations and Marine Technical Support assumed administrative responsibilities and headed the program as part of his duties as associate director. His duties as program manager concluded in the early spring of 1980, when the Alpha Helix program was discontinued. The program manager's chief duties were to assure the most efficient guidance and productive scientific utilization of R/V Alpha Helix and to represent the University of California, San Diego, Scripps Institution of Oceanography and Alpha Helix program in all matters of policy and long term goals as well as overall supervision of the Program Management Office. He also supervised three persons, an administrative assistant and marine technicians. A spectrum of other duties were performed by the administrative assistant and the marine technicians of the Program Management Office. These were to maintain updates on scientific proposals and progress of scientific work from beginning to end of expeditions, field questions and answers from interested scientific participants and committees, assist participating scientists in matters of logistics and personal travel, confer with them on the planned research support operation, and publicize and complete coverage of R/V Alpha Helix to the local media and other general responsibilities within the functions of these positions.

The excellent and unique quality of work completed on R/V Alpha Helix expeditions is universally recognized and the following is a narrative account of R/V Alpha Helix expeditions during its fifteen years of service to the University of California, San Diego.

From March to November, 1966, scientists aboard the research vessel Alpha Helix conducted biological and physiological research on tropical mangroves, reef corals, and sea and land animals at the Great Barrier Reef of Australia. The chief scientists on the Billabong Expedition were Per F. Scholander, Theodore H. Bullock, Francis T. Haxo, and Harold T. Hammel.

Scientists on the Amazon Expedition conducted research at the Brazilian Amazon Basin, near the Rio Negro and Rio Branco Rivers from February through December 1967. Research teams investigated behavioral and evolutionary transitions of fish and animal life, insects and tropical fruits in their various environments. The chief scientists were Theodore H. Bullock, Knut Schmidt-Nielsen, Carroll M. Williams, and Jacob B. Biale. Homeward bound from the Amazon, scientists studied deep-sea marine life in the Galapagos Islands area, led by Chief Scientist Malcolm S. Gordon.

The Bering Sea Expedition was conducted from February to October 1968, with Chief Scientists Per F. Scholander, Kjell Johansen, C. Ladd Prosser and Andrew A. Benson. The research program included biological and temperature studies on various cold water fishes, salmon, and seaweed.

The New Guinea Expedition, June to September 1969, included broad investigations into the comparative physiology and behavior of a wide variety of mammals, birds, and fishes. Chief scientists were George A. Bartholomew, Charles G. Sibley and John B. Buck.

From February to May 1970, R/V Alpha Helix was at Guadalupe Island while scientists carried out physiological investigations on fish and elephant seals under the direction of Chief Scientists Malcolm S. Gordon and Gerald L. Kooyman. During 1970, eight research efforts involving physiological, biochemical, and biological oceanographic studies were conducted in the coastal waters off western North and South America under Chief Scientists Richard W. Eppley, James J. Childress, Mario Pamatmat, William A. Dunson, William A. Newman, Peter W. Hochachka, Bruce W. Frost, and George W. Anderson.

From January to February 1971, Chief Scientist Edvard A. Hemmingsen carried out physiological studies of mammals, birds, and fishes during the Antarctica Expedition. Chief Scientist Robert E. Johannes conducted comprehensive research of coral reef metabolism in the vicinity of Eniwetok Atoll from May-June 1971. In 1971, Bruce H. Robison led a team of scientists engaged in physiological observations at Hukilau. Another expedition took place in 1971 that supported five cruises in the Eastern Pacific. Biological oceanographic and physiological investigations on sharks, whales, and squid were studied by Chief Scientists Reuben Lasker, Gerald L. Kooyman, Michael M. Mullin, and G. David Lange.

During 1972, R/V Alpha Helix was engaged in marine chemical and ecological studies in the Gulf of California (Aztec Operation), with Chief Scientist James H. Mathewson; neurophysiological investigations off Southern California, a two-phase program of physiological investigations in the Bering Sea with Chief Scientists Robert W. Elsner and L. Keith Miller in charge, and three separate human medical programs in the central and Southwestern Pacific under Chief Scientists Albert Damon, D. Carleton Gajdusek, and Ronald Carr.

In 1973 studies carried out aboard R/V Alpha Helix included biological studies of sea snakes north of Australia, under Chief Scientist William A. Dunson and neurological and photorespiration investigations at the Great Barrier Reef with Susumu Hagiwara and Nathan Edward Tolbert as chief scientists. The Bering and Chukchi Seas Expedition transpired from July through September 1973, under Chief Scientist Robert W. Elsner whose work centered around biomedical investigations of northern species of seals and other marine mammals. The research during the Kona Coast Expedition was devoted to biochemical investigations of deep sea fishes under the leadership of Paul Dreizen.

Nine research efforts were carried out in the North Pacific and off western North America during 1974. The expedition names, dates and chief scientists were Baja California, February-April 1974, Lowell P. Hager; North Pacific (Dramamine II), April-May 1974, Michael M. Mullin; Aleutian Trench Cruise, June 2-3, 1974, A. Aristides Yayanos; Bering Sea, June-July 1974, Vera Alexander; British Columbia, August-September 1974, Andrew A. Benson; Seattle-San Diego Cruise, September 22-29, 1974, Reinhold A. Rasmussen; San Clemente Cruise, October 24-25, 1974, Elizabeth Kampa Boden; Gulf of California, October-November 1974, Osmund Holm-Hansen; and the Clarion Expedition, November-December 1974, Andrew A. Benson. The work carried out ranged from mass spectrometric analyses of halogen incorporation in marine plants and invertebrates to biomedical investigations of the degenerative processes of migrating and spawning salmon.

The Crosspac Expedition to Australia, Indonesia, and the Philippines started on January 27, 1975. During the four phase East Asian Expedition scientists carried out bioluminescence work in Indonesia, under the leadership of James F. Case and G. Adrian Horridge, comparative physiology studies off Brunei under Brian K. McNab, multidisciplinary coral reef research under William A. Dunson and intensive functional investigations of marine snakes and the chambered Nautilus in the Philippines under James R. Redmond and Gary Lopez. This expedition ended on December 1975.

In March 1976, R/V Alpha Helix departed San Diego on an 18 month expedition to the Amazon. While en route, Joint II Expedition was in operation conducting studies off Peru. The Joint II Expedition had several legs. On leg 0 scientists analyzed ocean fronts with Thomas T. Packard as scientist-in-charge. Current-meter readings and meteorological studies were conducted under Robert Smith and Richard Dugdale of leg 1A and leg 1B, and the study of phytoplankton ecology was carried out with Richard T. Barber as chief scientist for leg 2. In May, R/V Alpha Helix transited the Panama Canal, to Belem and up to the tributaries of the Amazon River to begin phase I, legs I and II of the Amazon Expedition with John M. Edmond in charge of a geochemical sampling and sediment load study program. Phase II occurred between July-August 1976 under the direction of James V. Neel with studies concentrating on six Ameri-Indian tribes. The R/V Alpha Helix was employed for several days between phase II and III of the Amazon Expedition by Brazilian researchers of the Instituto Nacional de Pesquisas da Amazonia (INPA). The INPA cruise took place in August-September 1976 under the direction of Aurelina Lopez Castrillon. R/V Alpha Helix's September-October phase III operations were directed by Peter W. Hochachka (leg 1) and David Randall (leg II). Experiments were conducted to study the pulmonary, kidney, and other physiological characteristics of aquatic vertebrates. In November and December 1976, phase IV was under way with Austen F. Riggs leading a group in equilibrium and kinetic studies of various Amazonian fish. In January 1977, an international team of physiologists and ophthalmologists, under the leadership of J.A.C. Nicol studied the structure, function, and retinal pigments of the eyes of fish and freshwater dolphin during phase V. Phase VI included a one month run upriver, from Manaus to Iquitos, led by Ghillean T. Prance during which disc gel electrophoresis of riverbank plants was accomplished. From late March through mid-May, phase VII found the R/V Alpha Helix based far upriver at Pebas, Peru, on a botanical and pharmacological study of hallucinogenic plants led by Richard S. Schultes and Bo Holmstedt. From May-June, 1976, John M. Edmond repeated earlier observations of the river system's characteristics, completing the eighth and final phase of R/V Alpha Helix's Amazon 1976-1977 program.

During June 1976, R/V Alpha Helix proceeded northwest along the northern coast of Southern America while zooplankton collections and hydrographic observations were being made under the direction of Abraham Fleminger. She then operated from Belize City under D. John Faulkner's direction for a three week scuba diving investigation of algal and animal life on the coastal and offshore coralline reefs. This work concluded the Amazon-Caribbean Expedition and by mid-October R/V Alpha Helix was back in Belize City to undertake a long-term multi-site study of seagrass ecosystems with the first phase of the Caribbean-Pacific Expedition under John C. Ogden. Scientists conducted physiological experiments on the green turtle, made sediment collections, and biomass analyses. During phase II, Chief Scientist Clement L. Markert directed investigations of the biomedical evolution of genes in fish. In December 1977, phase III, Audrey Haschemeyer and colleagues continued the examination of fish for studies in protein synthesis. Late in January 1978, at Academy Bay, Galapagos Islands, Lanna Cheng, chief scientist of phase IV studied the physiology and behavior of the water

strider Halobates and the prochlorophytic alga Prochloron. During phase V of the Caribbean-Pacific Expedition under Kenneth L. Rinehart, species of marine life were examined for antibacterial, antifungal, and antiviral substances. From March-April 1978, William A. Newman directed phase VI, in coastal sampling to collect and examine provincial and not so provincial barnacles, sponges, and decapod crustaceans. William H. Fenical, chief scientist for phase VII conducted studies of natural products chemistry in Western Mexico. During June-August 1978 R/V Alpha Helix was in the Galapagos to investigate marine iguanas under George A. Bartholomew's phase VIII. The next part of R/V Alpha Helix's Caribbean-Pacific Expedition, phase IX took her to Costa Rica and Nicaragua for study of the respiratory and circulatory physiology, energetics, temperature regulation, and behavior of the green turtle, with Henry D. Prange as chief scientist. During phase X, Abraham Fleminger, chief scientist, sampled zooplankton on station profiles in the nearshore waters off Mexico in a joint program with Mexican investigators.

On March 2, 1979, R/V Alpha Helix sailed for Cairns, Australia, for the Moro Expedition, where phase I, under Patrick L. Parker, included studies of the eel grass ecosystems. Abraham Fleminger headed the phase II program carrying out near shore samplings of zooplankton for biogeographical distribution. R/V Alpha Helix arrived in Cebu City on July 24, 1979 to prepare for the imminent coconut crab program in the Palau Islands, with Chief Scientists James Cameron, phase III, and William Fenical, phase IV. Phase V, the final phase of this expedition, and the last for the R/V Alpha Helix with Scripps Institution of Oceanography ended on November 1979, under Chief Scientist John Arnold's direction at Tannon Channel, Philippines. It was fitting that the main emphasis of the last expedition was the same as the designer's original intent for this floating laboratory: physiology.

In the late seventies, interest in R/V Alpha Helix declined within the scientific community. The Alpha Helix Review Committee passed a motion during its March 27 and 28, 1979 meeting to consider whether continuation of R/V Alpha Helix as a National Oceanographic Facility was justified. The AHRC recommended that an ad hoc Committee be established by the Advisory Counsel of UNOLS to discuss possible remedies and future courses of action for the vessel. In their report, the committee stated:

> It appears that the cause, or causes, of the current low demand are not remediable in the near term by any action that NSF, UNOLS or Scripps can take, and that the causes must be addressed in the long term if a national capability in expeditionary biology is to be preserved.[6]

In view of their findings the committee found that continuation of R/V Alpha Helix as a National Oceanographic Facility was not justified, and on May 15, 1979, the National Science Foundation concurred with the UNOLS Advisory Committee and terminated the designation of National Oceanographic Facility.

Robert L. Fisher concluded in May 11, 1979,

> The continued use of Alpha Helix as a field experimental biology facility does not appear certain in the short term, though it may come back into such employment several years hence. The program office and staff are funded until early spring, 1980, and a great deal of field and shore-based work requiring the technicians services remains before then. Unless a marked change in funded activity from U.S. sources or an immediate influx of long-term foreign support takes place, the Alpha Helix field program will not be in effect after early 1980.[7]

On October 24, 1980, he said,

> This grant NSF #OCE 78-07340 provided field and clerical support to carry out the Alpha Helix Program, which employed the research vessel Alpha Helix as a field experimental biology National Facility operated by Scripps Institution of Oceanography of the University of California. Overall guidance, and administrative responsibility, was provided by the non-salaried Principal Investigator who headed the program as part of his Associate Director's duties. The

> program concluded about 15 years of operation in mid-1980 and Alpha Helix was assigned by the Foundation to other uses. As your records show, the Alpha Helix Program Office support grant from the Foundation (OCE 78-07340, of which I am Principal Investigator) will terminate on 31 August 1980.[8]

The final field program was concluded in December 1979, and the staff, which included Vanessa Wilds Cunningham, Dennis Popp, and John Boaz, worked well into 1980 carrying out the necessary close-out activities, final billings, settlement of accounts, fiscal and procedural matters, and submitted the necessary reports to finalize the program.

The transfer of title of R/V Alpha Helix by the Regents of the University of California to the government occurred in January 1980. Title to the ship was transferred to the National Science Foundation by a document pursuant to the provisions of the National Science Foundation Act of 1950, 42, U.S.C. 1861 et seq.

William A. Nierenberg concluded,

> We consulted widely with all our committees at SIO and we have essentially unanimous agreement that we dispose of the vessel rather than lease it. The most likely alternative is to return the vessel to the government via National Science Foundation as quickly as possible. If the vessel is returned to the NSF they personally will go through their usual procedure of advertising the vessel and it will be assigned in a regular priority fashion to the appropriate bidder, or, in other words, the next institution in line.[9]

R/V Alpha Helix is currently based at the Seaward Marine Center, Institute of Marine Science, University of Alaska, Seward, Alaska. The National Science Foundation turned title over to the University of Alaska in late 1980. The ship is operated by the University of Alaska and the National Science Foundation and University-National Oceanographic Laboratory System are still very much involved with the program. There is a ship committee, similar to the Alpha Helix Review Committee, whose members are located in Fairbanks, Alaska.

Footnotes:

1: The Floating Biological Laboratory: Concept and Realization, An Assessment of the first Five Years of Operation of the Research Vessel Alpha Helix, 1966-1970 and Recommendations for It's Future Mission, A Report Requested by the National Science Foundation Prepared by the National Advisory Board for the R/V Alpha Helix, May, 1971, University of California, San Diego.

2: Charles G. Sibley. The Alpha Helix Expedition to New Guinea. Discovery, 4(1), Fall, 1968.

3: Ibid.

4: See letter, Dr. Walter F. Garey to Dr. Edward E. David, July 11, 1972. 81-9, Box 3, (Code 010), SIO Office of the Director, Nierenberg, 1965-1975, SOMTS/Alpha Helix, 1972-1975, SIO Archives, La Jolla, CA.

5: See letter, Dr. Vera Alexander to Dr. William A. Nierenberg, September 3, 1976. 81-9, Box 3, (Code 010), SIO Office of the Director, Nierenberg, 1965-1975, SOMTS/Alpha Helix, 1976-1978, SIO Archives, La Jolla, CA.

6: See Report of the ad hoc Committee on Alpha Helix, April 30 and May 1, 1979. 81-9, Box 3 (Code 010), SIO Office of the Director, Nierenberg, 1965-1975, SIO Archives, La Jolla, CA.

7: Robert L. Fisher, May 11, 1979. 81-14, Box 8, f376, SIO Alpha Helix Program Office, 1966-1980. Layoff Notices, July 1979-January 1980, Personnel Information, SIO Archives, La Jolla, CA.

8: See letter, Dr. Robert L. Fisher to Mary K. Johrde, October 24, 1980. 81-88, FC 44, SIO Ship Operations and Marine Technical Support, 1975-1980, Alpha Helix Program: Winding Down, (chiefly mid-1980), SIO Archives, La Jolla, CA.

9: See letter, Dr. William A. Nierenberg to David A. Dorinson, August 29, 1979. 81-9, Box 3, (Code 010), SIO Office of the Director, Nierenberg, 1965-1975, SOMTS/Alpha Helix 1979-1980, SIO Archives, La Jolla, CA.