

**May-June 1968**

**ANTARCTIC JOURNAL**  
**of the United States**

# ANTARCTIC JOURNAL

## of the United States

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*and*

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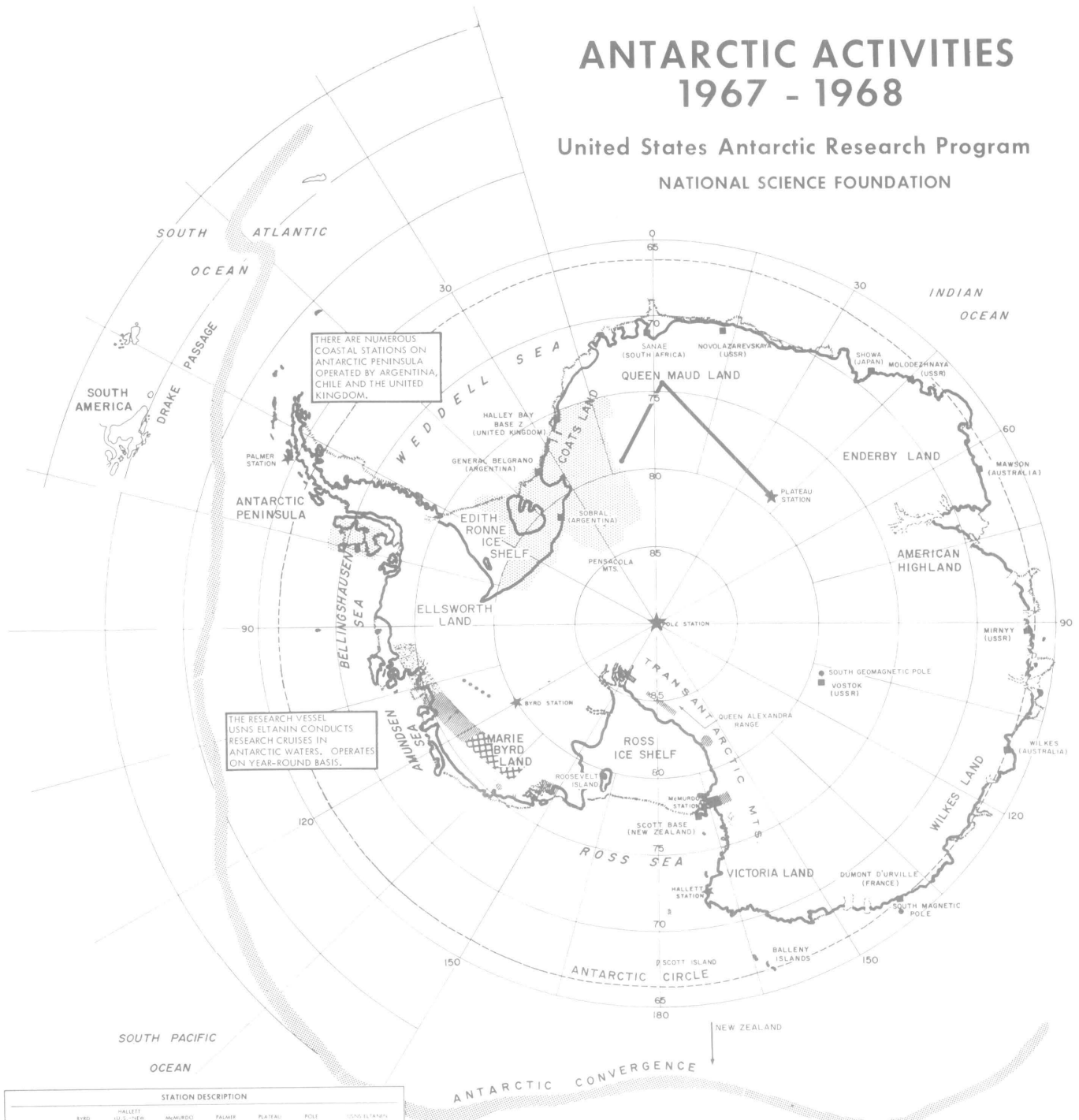
*Greenwich Mean Time is used, except where otherwise indicated.*

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# ANTARCTIC ACTIVITIES 1967 - 1968

United States Antarctic Research Program  
NATIONAL SCIENCE FOUNDATION



THERE ARE NUMEROUS COASTAL STATIONS ON ANTARCTIC PENINSULA OPERATED BY ARGENTINA, CHILE AND THE UNITED KINGDOM.

THE RESEARCH VESSEL USNS ELTANIN CONDUCTS RESEARCH CRUISES IN ANTARCTIC WATERS. OPERATES ON YEAR-ROUND BASIS.

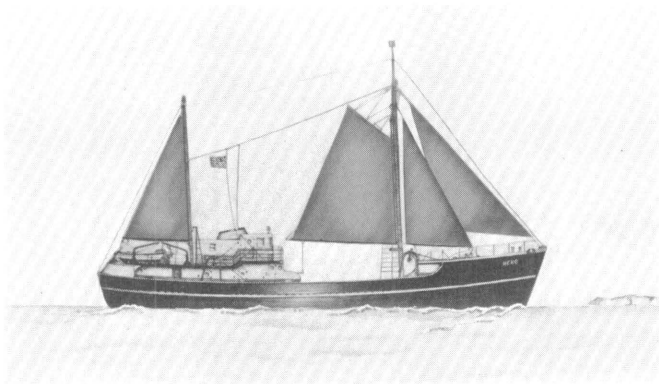
STATION DESCRIPTION							
	BYRD (U.S. - NEW ZEALAND)	HALLEY (U.S. - NEW ZEALAND)	MCMURDO	PALMER	PLATEAU	POLE	USSR-ELATANIN
LOCATION	LAT. 76°15'S LONG. 156°50'W	LAT. 75°52'S LONG. 166°57'W	LAT. 77°51'S LONG. 156°51'W	LAT. 64°43'S LONG. 58°57'W	LAT. 69°05'S LONG. 46°30'W	LAT. 89°51'S	SOUTH PACIFIC OCEAN
FEET ABOVE SEA LEVEL	5,012	18	102	25	5,880	5,184	
ESTABLISHED	1957	1957	1956	1963	1960	1957	1962
TERRAIN	ON THERMAL	ON GLACIAL MORAINES	ON VOLCANIC MOUNTAIN	ON BEDROCK	ON ICEBERG	ON ICELAND ICE	
METHOD OF SUPPLY	AIR	AIR	SEA	SEA	AIR	AIR	
NUMBER OF PERSONNEL	13	10	70	2	8	11	
MEAN ANNUAL TEMPERATURE (°F)	-18.8	-14.2	-10.1	-20	-18.9	-56.7	
MEAN TEMP. (°F) DEC. - JAN. - FEB.	+1.8	+28.2	+21.6	+20	+17.9	+21.2	
APPROXIMATE WINTER PERSONNEL (SCIENTISTS)	11	SUMMER STATION ONLY	8	5	8	7	12 (WINTER) 38 (SUMMER) (TOTAL) 11 (WINTER) 18 (SUMMER) (TOTAL)
AIR DISTANCE FROM MCMURDO (STATUTE MILES)	883	306	2,760	1,104	830		

**LEGEND**

- ★ U.S., U.S. Cooperative Stations
- Foreign Stations
- ▨ Aerial Photography for Mapping
- ▩ Geological Field Parties
- ▧ Map Control
- ▦ Biological Field Parties
- ▤ Geophysical Investigations
- Traverse
- Glaciology

# Hero: A New Antarctic Research Ship

## Adjunct to Palmer Station Permits Diversified Research Program



(NSF Drawing)  
Artist's concept of Hero

In 1820, a flotilla of five vessels from Stonington, Connecticut, sailed across the Drake Passage and dropped anchor in the sheltered waters of a group of islands now known as the South Shetlands. Its mission was to hunt the southern fur seal. Toward that end, the flotilla's leader, Captain Benjamin Pendleton, instructed Nathaniel B. Palmer, 20-year-old skipper of the sloop *Hero*, to explore the waters southward. Palmer sailed his 30-foot vessel first to Deception Island, crossed a broad strait toward the next high land visible to the south (Trinity Island), skirted it, and then saw a narrow stretch of water (Orléans Strait) between that island and a long, rugged coast backed by a high range of mountains (now known to be part of the Antarctic Peninsula) that lay still farther south. Fast ice kept *Hero* from reaching land, and Palmer was soon forced to rejoin the Stonington fleet in the Shetlands. Whether the young skipper found fur seals in commercially attractive numbers on this voyage is not recorded, but it is likely that he saw many of them. In addition, he has been credited as being the first person to view the antarctic mainland.<sup>1</sup>

In recognition of that discovery, Palmer's name has been officially identified with the southern part of the Antarctic Peninsula (Palmer Land)<sup>2</sup> and

<sup>1</sup> The British sea captains William Smith and Edward Bransfield, in the brig *Williams*, and the Russian captain Thaddeus Bellingshausen, in *Vostok* and *Mirnyy*, have also been credited with the first sighting of the Continent.

<sup>2</sup> The Peninsula was previously known by different names to different countries (Palmer Peninsula to the United States). In 1964, the United States and United Kingdom agreed to call it the Antarctic Peninsula; subsequently, several other Treaty nations have accepted this name.

with the U.S. research facility (Palmer Station) on Anvers Island, off the Peninsula's northern coast. Most recently, in further recognition of Palmer's bold voyage of discovery, the National Science Foundation named its new, 125-foot antarctic research ship in honor of his sloop *Hero*.

The new *Hero*, a diesel-driven, but sail-equipped, wooden, trawler-type ship designed to round out the facilities at Palmer Station, was launched on the high tide of March 28, 1968, at South Bristol, Maine (see next page). By June, *Hero's* masts and rigging will have been added and she will have been thoroughly outfitted for a series of shakedown cruises. In late summer, when these have been completed, she will sail south towards the Strait of Magellan and her antarctic port at Palmer Station.

Like her namesake, the new *Hero* will operate in Antarctic Peninsula waters, but, unlike the sloop, she will be devoted to research instead of commerce. Specifically, *Hero* will contribute to scientific knowledge of the Peninsula and nearby waters as part of the U.S. Antarctic Research Program. In doing so, she will (1) transport scientists to points of interest on the Peninsula's coast and islands, (2) serve as an oceanographic station for biological, geological, and other studies inshore and along the continental shelf of the Peninsula, and (3) provide transportation between ports in southern Chile and Argentina and Palmer Station, as well as between Palmer and the scientific bases of other nations in the Peninsula region.

### Region of Operations

The Antarctic Peninsula, which stretches in a serrated arc from about 73°25'S. to 63°20'S., is a

## The Launching of Hero

At about 1030 (local time) on March 28, 1968, the National Science Foundation's new research ship began sliding down the ways at the Harvey F. Gamage shipyard in South Bristol, Maine. At that moment, the ship's sponsor, Mrs. Leland J. Haworth, wife of the Foundation's director, cracked the traditional bottle of champagne against the vessel's bow and declared, "In the name of the United States, I christen thee *Hero*."

The event, which culminated several years of ship design and construction, was witnessed by many local citizens and about two dozen distinguished guests. In addition to Mrs. Haworth, they included Representative Peter N. Kyros (D-Maine); Dr. Leland J. Haworth, Director of the National Science Foundation; Dr. T. O. Jones, Director of NSF's Environmental Sciences Division; Mr. Thomas Pross, U.S. Maritime Administration; Mr. Stanley Potter, the ship's designer; and Mr. Harvey F. Gamage, her builder.

Following an inspection of the ship, a luncheon was held at the Naval Air Station, Brunswick, Maine, for the distinguished guests. Mrs. Haworth was presented a plaque (carved from South American greenheart, the same kind of wood with which the vessel is sheathed) evidencing her sponsorship of the new ship. Congressman Kyros was the principal speaker.

*Mrs. Leland J. Haworth christens Hero. Looking on are Mrs. Thomas O. Jones, matron of honor, and Vice Admiral Roy A. Gano, USN (Ret.), master of ceremonies.*

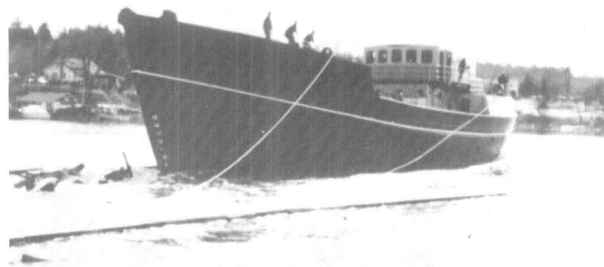


*(Photo by U.S. Maritime Administration for NSF)*



*(Photo by U.S. Maritime Administration for NSF)*

*Above, Hero leaves shipyard at South Bristol and, below, moments later, floats in adjoining harbor.*



*(NSF Photo)*

complex geographical feature. It consists essentially of an ice-capped central plateau, in places more than 8,000 feet high, and of ragged, rocky coasts sprinkled with numerous islands. Huge glaciers flow from the ice cap to the sea.

In contrast to the climate of the interior, which is characterized by dry air masses, the climate of the Peninsula is of the polar maritime type, much like that of the Aleutians. Along the coasts, temperatures range from  $-29^{\circ}\text{C}$ . to  $+4.5^{\circ}\text{C}$ . and average about  $-4.5^{\circ}\text{C}$ . Severe storms occur frequently as low-pressure systems cross from the South Pacific to

the South Atlantic. Persistent low-lying clouds present a further hazard to ship operations and preclude aerial search-and-rescue activity much of the year.

The Peninsula is flanked on the east by the ice-covered Weddell Sea and on the west by the South Pacific Ocean. It is separated from South America by the 600-mile-wide Drake Passage, whose waters are generally considered the stormiest in the world.

Ocean water of the Peninsula region is highly productive of marine life because of the effect of low-pressure systems near the Continent, which cause upwelling of bottom waters and the conse-

quent occurrence of nutrient salts (silicates, nitrates, and phosphates) near the water's surface. Phytoplankton, particularly diatoms, are so numerous that in many places they form a "bloom" on the water surface and discolor vast areas of ice. Copepods, krill, pteropods, ostracods, and jellyfish "graze" on the phytoplankton. The benthic fauna on the continental shelf is luxuriant, including bryozoans, sponges, hydroids, crustaceans, molluscs, starfish, sea lilies, sea cucumbers, and sea spiders. Most fish of Peninsula waters are of the genus *Notothenia* (antarctic cod), ranging from 3 to 18 inches in length. Seven species of whales and six of seals comprise the mammalian population.

The terrestrial vegetation consists of about 70 species of mosses and about 350 of lichens. The land fauna is comprised of two species of midge and many species of mites and springtails, the latter being the largest form endemic to Antarctica. Among the many birds that visit the Peninsula during the summer, the sheathbill is unique in that it is the only one without webbed feet. Penguins occur in abundance along the coasts during the breeding season.

The continental shelf adjacent to the Peninsula is rather broad on the east side and narrow on the west. Extremely rugged bottom topography has been mapped in the vicinity of the South Shetland and South Orkney Islands.

On several of her early cruises, the antarctic research ship USNS *Eltanin* explored the Drake Passage, Scotia Sea, and waters in the vicinity of the Shetland, South Orkney, South Georgia, and South Sandwich Islands, including the northern fringes of the Weddell Sea (to about 67°S.). Off the Peninsula's west coast, she has sailed within 50 miles of Adelaide Island. Icebreaker-supported investigations have been carried out in the waters immediately adjacent to the Peninsula as far south as Stonington Island. Other recent studies have been conducted by ships of Great Britain, Chile, Argentina, and the U.S.S.R. Much of the inshore area has not been studied, however. It is for this work that *Hero* and her supporting laboratories and logistics facilities at Palmer Station were designed.

### Scientific Programs

Throughout the austral summers, *Hero* will work in Peninsula waters. As the sea ice closes in, she will sail northward and operate during most winters from ports in South America.<sup>3</sup> While in the Peninsula region, *Hero* will serve as a floating laboratory for investigations of both marine and terrestrial subjects—a unique arrangement, considering that most re-

search ships are dedicated almost entirely to oceanic research. Her commitment to land investigations comes about because most of the Peninsula is accessible only by ship and ship's helicopters and boats, and, in the past, these have been available only occasionally to Palmer Station scientists. *Hero* will provide the first access to many coastal areas.

The ship will be equipped for hydrographic studies, bathythermograph lowerings, continuous water-surface and air-temperature recordings, bottom photography, precision depth recording, magnetic and seismic reflection recording, and piston and gravity coring. Normal over-the-side biological collecting gear will be available as needed. Because of limited berthing and laboratory facilities, the shipboard research will require highly coordinated and integrated planning. It is expected, therefore, that on each cruise, investigations will be carried out either by scientists from a single institution or by representatives of several institutions who have arranged mutually complementary studies.

### Development of the U.S. Antarctic Peninsula Program

The Antarctic Peninsula has been the scene of several exploratory and research efforts by the United States, including the First Antarctic Developments Project (*Operation Highjump*) of 1946-1947 (Bertrand, 1967), the Second Antarctic Developments Project ("Operation Windmill") of 1947-1948 (Smith, 1968), and the Ronne Antarctic Research Expedition of 1947-1948. The United States did not operate a station on the Peninsula during the International Geophysical Year, but the post-IGY expansion of the U.S. program to embrace biology and other sciences that had not been a part of the IGY program has again stimulated U.S. interest in the Peninsula.

Following the decision to establish a U.S. research station on the Antarctic Peninsula, a team comprised of polar scientific and logistic experts conducted an extensive survey of the region in January-February 1963. From an examination of about 30 potential station sites, Arthur Harbor on the southwestern coast of Anvers Island emerged as the one

<sup>3</sup> In September 1965 and August 1966, reconnaissance flights were made over the Bransfield and Gerlache Straits as far south as the Argentine Islands to examine winter sea-ice conditions (Smith, 1966). Observations indicated that *Hero* probably could work safely in these waters during the winter, but that difficulty would be encountered making a passage to South America through the wide belt of pack ice north of the South Shetland Islands. Hence, there are no immediate plans for *Hero* to remain in antarctic waters in the winter.

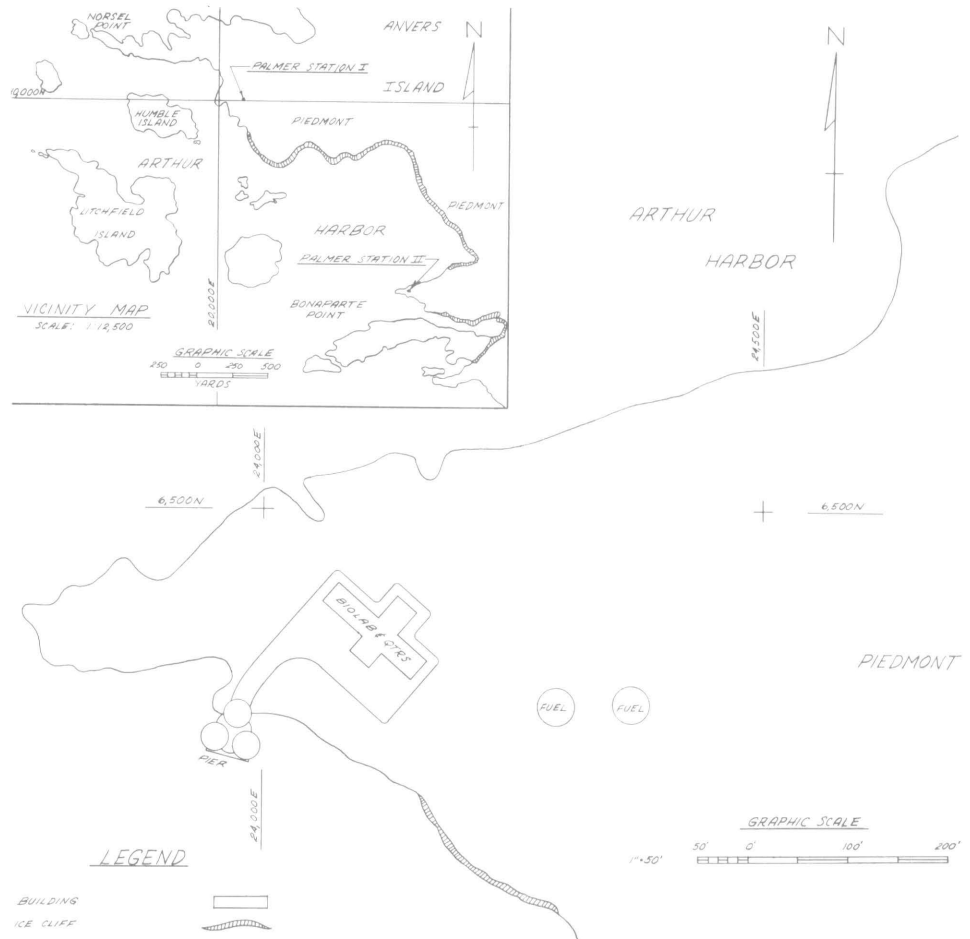
satisfying most of the established criteria (Jones, 1964). The team considered the mountainous and ice-capped 24- by 37-mile island an admirable location because it is centrally located for operations over the length of the Peninsula and is about as far south as one could expect to find favorable sea-ice conditions during the austral summer.

During the survey, it became apparent to the investigators that research programs would be considerably handicapped when icebreakers and their helicopters or other means of transportation were not available. It was equally clear that exploiting the great research potential of the Peninsula region depended on having a ship equipped for marine biological research. It was recommended, therefore, that a specially equipped, shallow-draft ship be built to work along the inshore waters not accessible to the deep-draft icebreakers. Based on this recommendation, plans for U.S. research programs in the Peninsula region were developed around the combination of a shore facility and a research ship.

Early in 1964, a second survey team visited Anvers Island to determine exactly where to build the new station. The site chosen, called "Norsel Point," was also the one on which the British Antarctic Survey's Base "N" was located—an eight-man hut erected in 1955 to facilitate geological and biological studies (Hooper, 1962; Holdgate, 1963). A gracious offer by the British for the United States to use the base, which had been deactivated in 1958, was readily accepted because the hut would provide shelter while new construction was under way and could serve later as a scientific laboratory. Shortly afterward, the Navy's Bureau of Yards and Docks<sup>4</sup> began designing the interim station's first buildings—temporary, prefabricated structures intended for only a few years of service (until permanent facilities could be constructed). These buildings, which accommodated as many as 15 persons, were erected in the 1964-1965 austral summer, and the facility was commissioned Palmer Station on February 25, 1965.

<sup>4</sup> Now the Naval Facilities Engineering Command.

Palmer Station location and layout; temporary facilities are at position I, and new facilities are at position II.



(Naval Facilities Engineering Command Drawing)

Planning for the research ship was done concurrently with the development of shore facilities. On November 24, 1964, the National Science Foundation awarded a contract to Potter and M'Arthur, Inc., Boston, Massachusetts, for the design of *Hero*. On July 11, 1966, after major features of the design had been worked out, the Foundation awarded a construction contract to Harvey F. Gamage, Shipbuilder, Inc., of South Bristol, Maine, and work began in October of the same year. Arrangements for the contracts were made through the Maritime Administration, which assumed responsibility for overseeing all design and construction activities. Both the ship and the permanent station were scheduled for completion early this year so full operations on the Antarctic Peninsula could begin during the 1968-1969 austral summer.

Construction of the permanent station at Arthur Harbor was begun at "Site Bravo" early in 1967 by Platoon Alpha of Naval Construction Battalion Unit 201. "Site Bravo" is located 1½ miles from Norsel Point on solid rock that is bordered on one side

by the water and ice of Arthur Harbor and on the other sides by large ice and snow fields. Last year, blasting was completed at the main building's 128-by 100-foot site in time to allow erection of the foundation and subflooring. In addition, a cellular steel pier, a road from the pier to the station site, and two 125,000-gallon fuel tanks were built.<sup>5</sup> This year, the building was finished, and an antenna farm (permitting communications with McMurdo Station and with Balboa in the Panama Canal Zone), a small boat ramp, fuel lines, and most of a helicopter pad were completed. The new station was commissioned on March 20 (see next page).

The main building, a three-story, steel-frame structure, contains about 10,000 square feet of space. One wing includes a well-equipped biology laboratory, a storage area for laboratory equipment, and an electronic workshop and satellite readout area with two offices for scientists. The opposite wing contains a machine shop and storage space for *Hero*'s

<sup>5</sup> *Antarctic Journal*, vol. II, no. 4, p. 142-143.



Site of the new Palmer Station (indicated by arrow) and its surroundings.

(U.S. Navy Photo)

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## Permanent Palmer Station Commissioned

The United States has established permanent facilities at Arthur Harbor on Anvers Island to replace the temporary structures used since 1965 to support U.S. research in the Antarctic Peninsula region. The new station, which bears the same name as the one it has replaced—Palmer Station—was officially commissioned at 1730 on March 20, following the arrival that morning aboard USCGC *Southwind* of Rear Admiral J. L. Abbot, Jr., Commander, U.S. Naval Support Force, Antarctica, and Mr. Philip M. Smith, National Science Foundation representative.\*

The move to the station's new main building from the original Palmer Station—a distance of 1½ miles—was begun on March 14, one week after all of the internal utility

systems had been made operational, and it was completed on March 17, three days before the commissioning. In this operation, much assistance was rendered by the crews of the Coast Guard icebreakers *Southwind* and *Glacier*, which transferred cargo by landing craft and helicopter, delivered supplies from the ships to the station, and aided in preparing the station for the commissioning ceremony. Previously, members of Platoon Alpha had hurried to finish flooring the building so equipment could be moved into it while helicopter support was still available from the icebreakers.

Wintering over at the station during 1968 are three USARP personnel and six Navy men.

\* The name "Palmer Station" now encompasses both the new and the old facilities, the latter of which will serve as an emergency camp.



(U.S. Coast Guard Photo)

Flag is raised over new Palmer Station during dedication.

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spare parts and supplies. The connecting center section has living facilities for 24 men, a dining room, kitchen, recreation room, medical office, and the oil-heating and electrical utilities for the building. The station power plant has been designed to provide power both for the station and for *Hero* while she is moored at the pier.

During the 1968-1969 summer, a multipurpose building will be erected, completing the planned three-year cycle of construction. This building will provide additional storage space for the station supplies, a recreation room, garage, dormitory for transient personnel, and the station's amateur radio equipment. Two 150-kw generators to serve the main building and provide auxiliary power for *Hero* will also be located there.

The naval complement at the station now consists of six men: an officer-in-charge, a medical

corpsman who will serve both ship and shore personnel, a cook, station engineer, radio operator, and an electrician. Scientific personnel will number as high as 16 in the austral summers.

### Features of the Ship

Like most trawlers and offshore North Atlantic druggers built on the Maine coast, *Hero* is framed with large, native-oak timbers. Her mast and some interior work is of Oregon fir, and, in the tradition of ice-working vessels, her keel and sides are sheathed with tropical greenheart from Guyana, South America. *Hero* is markedly different from other ships of her class, primarily in the greater thickness and closer spacing of her framing. The ship's skeleton consists of an 18- by 18-inch keel and 6- by 6-inch framing spaced only 8 inches apart. Oak planking two inches thick overlies the framing, and the sheathing along the forward part

of the hull—which will have the greatest contact with ice—is overlain by metal plating. Other unusual features of *Hero* are the duality of much of her machinery and equipment, such as the double boiler, double engine, standby heating and circulating pumps, two generating power plants, and spare shaft, propeller, and sails.

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*Specifications*

Length, overall	125 ft
Breadth, molded	30 ft, 4 in
Draft, normal	12 ft, 6 in
Range	5,000 nm
Gross tonnage	300 tons
Horsepower	760
Speed (approx)	11 knots
Diesel fuel	76 tons
Fresh water	30 tons
Dry stores	258 cu ft
Refrigerated stores	220 cu ft

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*Hero* has two large decks and a superstructure. The superstructure consists of the bridge, pilot house, navigation-radio room, and a small after-deck on which the hydrographic winch and two nested dories are located. The main deck is enclosed at the bow to accommodate the hydrographic laboratory, located on the port side, and storage areas. It is exposed amidships to permit entrance to the hold and to allow for trawling operations and the storage of a 26-foot powered work boat. Immediately aft of this open section is a compartment containing the trawling winch and cable. Farther aft and amidships is the analytical laboratory, and adjoining it on the port side is the dissection laboratory, accessible from which is a large freezer for the storage of biological collections. The captain's cabin and berths for three crew members are located aft of the analytical laboratory.

The lower deck accommodates, from bow to stern, cabins for eight crewmen, mess, galley, three two-man cabins for scientists, a large hold for storage of equipment and supplies (in which bunks for four or five more scientists and a small instrument laboratory can be set up, or where as many as 10 persons can be berthed on voyages between South America and Antarctica), a microbiology laboratory, the engine room, and spaces for three crew members. Fuel and water tanks are located below this deck.

*Hero* is rigged for all of the over-the-side operations required to conduct the scientific projects. The equipment includes an electric deep-sea winch of three drums (each side drum carrying 7,200 feet of ½-inch-diameter wire for trawling and the center drum carrying 600 feet of ⅛-inch anchor line) and a

hydrographic winch with 12,000 feet of 3/16-inch wire.

Ketch-rigged, *Hero* can carry about 1,700 square feet of sail (mainsail, foresail, jib, and mizzen) to maintain control if her main propulsion system fails or to reduce roll while certain scientific operations are carried out. Use of the sail also permits silent-ship operations, which are desirable for acoustic work.

The main propulsion is provided by two 380-hp diesel engines connected to a single propeller shaft through a reverse-reduction gear. Two 60-kw AC generators provide the electric power, and two oil-fired steam boilers supply heat through a circulating hot-water system. Two evaporators supply fresh water by using excess heat from the main engine.

### Sea Ice and Navigation

*Hero's* sturdy construction is essential because she will be operating alone in some of the stormiest, most remote waters of the world, frequently in close proximity to sea ice. During the austral summer, the west coast of the Antarctic Peninsula is usually relatively free of ice as far as 66°S., although icebergs, bergy bits, and some fast ice are present along protected shores. Bransfield and Gerlache Straits and other inshore waters on the west, central, and northwest coasts are usually easily navigable in the summer, but are poorly charted. Most of the east coast is icebound during the summer; only its extreme northeast portion, in the vicinity of Joinville Island, is sometimes navigable, and then only with extreme caution. During the winter, pack ice may occur as far as 165 miles north of the Peninsula.

At present, there are no electronic navigational aids in the Antarctic Peninsula region. Although satellite-navigation equipment will be used aboard ship, particularly when visibility is poor, great dependence will be placed on celestial observations. In addition, conventional sonar, echo-sounder, and radar will be used. Information on weather and sea-ice conditions will be gathered by a weather-satellite (Automatic Picture Transmission) readout facility at Palmer Station, and additional data will be relayed from the United States.

### First-Year Operations

The National Science Foundation has awarded a three-year contract to Marine Acoustical Services, Inc., Miami, Florida, for operation of *Hero* and the laboratory facilities at Palmer Station. The firm has selected Sidney Hartshorne as the ship's master. The remaining nine crew members have been selected, and the three men who will be based at Palmer Station will be chosen soon.

# Ecology of Soil Microorganisms in the Vicinity of Almirante Brown Base

WILLIAM L. BOYD and IRWIN ROTHENBERG

*Department of Microbiology  
Colorado State University*

It is expected that the builder's trials and the acceptance of the ship by NSF will have been completed by July 1968, at which time two months of sea tests will commence. The first month will be devoted to training the crew and testing the ship under a variety of weather and operational conditions near Boston, Massachusetts. In August, longer shakedown cruises will take *Hero* to the Grand Banks and Davis Strait to test her ice-working abilities.

By late August, *Hero* will have completed her shakedown cruises and will have returned to Boston. She will then steam to the Washington (D.C.) Navy Yard, where an open house will be held in early September, thence to Miami, Florida, and on to Valparaíso, Chile, where she will arrive in mid-October. From there, she will proceed to Puerto Montt, Chile, to begin her first scientific cruise—a study of small whales and porpoises in Chilean waters. This study will be carried out cooperatively by an eight-man party from the University of California (Los Angeles) and Chilean scientists.

Upon completion of this work, *Hero* will leave for Palmer Station, where, in late December 1968, she will begin her support of antarctic research. Her operations there will continue until April 1969, at which time she will return to Tierra del Fuego for further scientific investigations.

One of *Hero's* early antarctic cruises will be to Deception Island to study the effects of its recent volcanic action on marine life. On her way to Deception, as she begins her crossing of Bransfield Strait, *Hero* will pass the entrance to Orléans Strait—the body of water to which Nathaniel Palmer sailed the first *Hero* almost 150 years ago en route to his discovery of the antarctic mainland. Conditions will be quite different, however. Whereas the sealers of 1820 were competing fiercely in the search for new sealing grounds, today's scientists—of many nations—work in harmony in the quest for basic knowledge.

## References

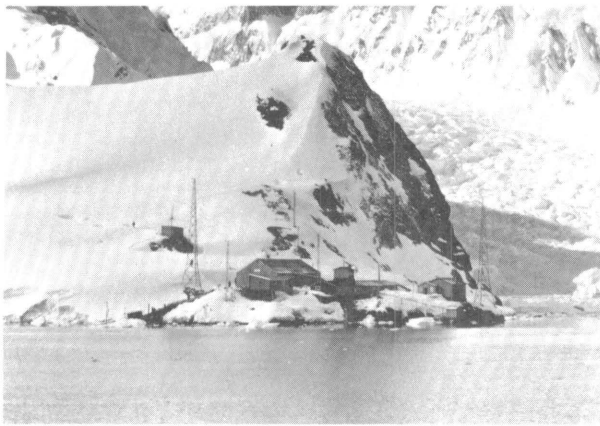
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From December 6, 1967, to January 14, 1968, the authors participated in a research program as guests of the Instituto Antártico Argentino at the scientific base Almirante Brown (Fig. 1) at 64°53'S. 62°53'W.) on Paradise Harbor. Almirante Brown was constructed by the Argentine Navy in 1951 and used as a naval base for the following nine years. From 1960 to 1965, it was closed. When reopened, on February 17, 1965, it was expanded to include additional living quarters and a laboratory equipped with excellent facilities for field research. Since that time, it has served as a year-round scientific base.

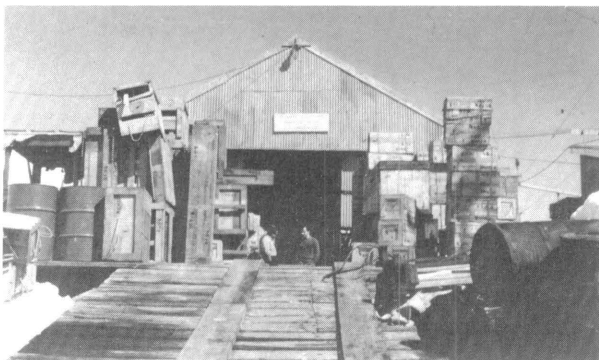
This report presents some of the authors' observations on the microbial ecology of the Paradise Harbor area and their correlation with observations made on Ross Island during 1961-1962 and in south Victoria Land and at Cape Hallett during 1962-1963 (Boyd, 1967; Boyd and Boyd, 1963, 1963a; Boyd *et al.*, 1966).

Although the role of microbes in the ecology of terrestrial habitats of Antarctica has not been completely elucidated, significant studies have been carried out during the last decade on bacteria, yeasts, and molds (Boyd *et al.*, 1966; Corte and Daglio, 1963; Margni and Castrelos, 1963; Di Menna, 1960; Sieburth, 1963). In addition, Sladen and Goldsmith (1960) studied viruses in humans, and Sieburth (1959) reported that flying birds have antibodies in their serum to the virus of ornithosis. To date, however, no significant work has been done to determine possible hosts for viruses among indigenous plants and animals. This is also true of the Rickettsiae. All of the other major plant microbes of the Protophyta and Thallophyta (Protista) have been reported to exist in a number of different habitats.

Certain areas bordering the Ross Sea (Ross Island and Taylor and Wright Valleys) do not support the growth of microorganisms (Boyd *et al.*, 1966; Benoit and Cameron, 1967), except in areas where certain blue-green algae occur. These algae, which derive their carbon from carbon dioxide and are capable of nitrogen-fixation (utilizing gaseous nitrogen



Almirante Brown Base as seen from the harbor. The building on the left contains laboratories, offices, and a photographic dark room. The buildings to the right of it provide living and food-storage space.



The research building, shown here, contains three laboratories, meteorological equipment, a workshop, and storage space.



Figure 1. VIEWS OF ALMIRANTE BROWN BASE.

(Photos by William L. Boyd)

The living quarters. They include a kitchen, bath, and food-storage area.

from the atmosphere, meltwater from glaciers, and dissolved minerals), can initiate growth and produce organic matter, which can then serve both directly and indirectly as food for other organisms. Penguin rookeries have a demonstrable flora, as might be expected, but in other areas of Antarctica the organic phase of "soil" is rather low or non-existent, restricting the higher vegetation to widely scattered clumps of lichens or mosses. Soils, as such, do not exist in many places, since neither organic nor living components may be present. Detailed reports on the lichens and mosses of these areas and areas to the north have been published by Rudolph (1963; 1966).

Compared with the areas observed near the Ross Sea, the Paradise Harbor area can most appropriately be classified as either subantarctic or oceanic antarctic. In the latter area, the summer air and soil temperatures are higher, and there is much more precipitation, some of it as rain. As a consequence, the moss and lichen flora is much more extensive (Fig. 2), and the molds are of a higher order; for example, *Ascomycetes* (Fig. 3) having apothecia 1-2 cm in height are present. *Basidiomycetes* of the genus *Galerina*, originally found growing at Spring Point (64°18'S. 61°03'W.) by Singer and Corte (1962), were not found. Significantly, the seed-bearing grass *Deschampsia elegantula* (Steud.) Parodi grows at Paradise Harbor (Fig. 4) but not in areas bordering the Ross Sea. The occurrence of this species at Paradise Harbor was first described by Corte (1961), who noted that its seeds were capable of germination *in situ*.

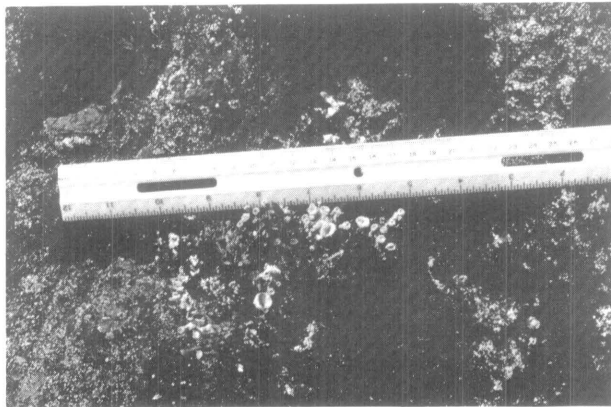
In addition to having a higher order of vegetation than the Ross Sea area, the Paradise Harbor area has a more abundant and diverse microbial population. A greater variety of physiologic and metabolic types were consistently found in habitats at Paradise Harbor; these were particularly noticeable at a gentoo penguin rookery near the base.

Spore-forming bacteria were restricted to rocky areas above the base that supported the growth of lichens, mosses, or grasses and to areas contaminated directly or indirectly by man. In the former areas, shells of the gastropod *Patinigera polaris* (Homb. and Jaq.) were deposited by *Larus dominicanus* Lichtenstein and other gastropod-eating birds. The gastropods did not carry spore-formers internally or on their surfaces, so either the birds were responsible for inoculating these habitats with these microorganisms, or the breakdown and chelation of the organic and inorganic phases of the gastropods produced optimal nutrition for bacterial growth—an occurrence which was not observed at the nearby beach habitats. If the latter alternative is ruled out, birds or other agents of transmission



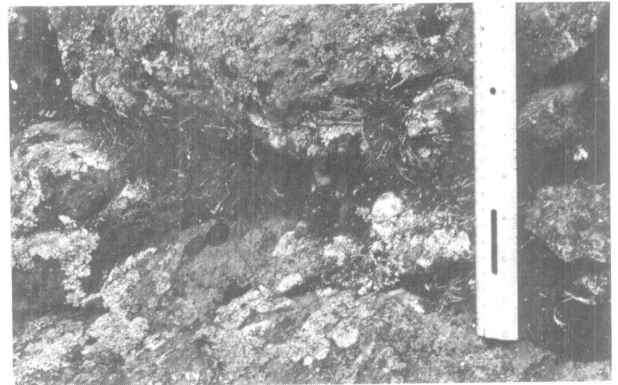
(Photo by William L. Boyd)

Figure 2. Lichens and mosses growing from rock crevices above station.



(Photo by William L. Boyd)

Figure 3. Molds of the class *Ascomycetes* growing on rock surfaces above the base.



(Photo by William L. Boyd)

Figure 4. The grass *Deschampsia elegantula* represents one of two genera of seed-bearing plants indigenous to Antarctica.

Summary of Plant Life Observed in Antarctica (1961-1962; 1962-1963; 1967-1968).

Organisms	Ross Island	South Victoria Land		Cape Hallett	Paradise Harbor
	77°30'S. 168°00'E.	Taylor Valley 77°39'S. 162°52'E.	Wright Valley 77°33'S. 161°30'E.	72°19'S. 170°18'E.	64°51'S. 62°54'W.
Viruses	?	?		?	?
Rickettsiae	?	?		?	?
Bacteria	+	+		+	+
	(Some areas "sterile")	(Some areas "sterile")			
Actinomycetales	+			+	+
Yeasts	+			+	+
Molds	+	+		+	+
		(Associated with mummified seals)			(Visible <i>Ascomycetes</i> )
Blue-green algae	+	+		+	+
		(Primary food producers)			
Green algae	+	+		+	+
Lichens	+	+		+	+
		(Only at higher altitudes)			
Mosses	+			+	+
Seed-bearing plants					+
					( <i>Deschampsia elegantula</i> )

pleted, it will be possible to reach a much better understanding of the microbial population's role in the ecology of these areas.

*Acknowledgements.* This study was supported by grant no. GA-1244 from the National Science Foundation. The authors wish to express their appreciation to Rear Admiral R. N. Panzarini, Dr. Otto Schneider, and Mr. Alfredo Corte of Buenos Aires; to the officers and crew of *Bahía Aguirre*; to Captain Federico W. Müller and Mr. Angel Abregu Delgado at Paradise Harbor; and to the many other people, too numerous to mention, whose cooperation and friendliness helped to make this field project successful.

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## International Exchanges, 1967-1968

During the past year, as in previous years, U.S. scientists conducted research or represented the United States on the antarctic expeditions of other countries, and scientists from other countries participated in the antarctic programs of the United States. Brief accounts of these exchanges are given in the following paragraphs:

### U.S. Exchange Scientists and Representatives

Accompanying the Japanese on their icebreaker *Fuji* for the annual resupply of Showa Station was Mr. Martin P. Sponholz, of the Environmental Science Services Administration (ESSA), who made observations of the lower atmosphere by means of sensors attached to a Kyttoon (kite-balloon) towed by cable behind the ship.

Aboard the British resupply ship *Thala Dan* that sailed to Halley Bay and the Antarctic Peninsula was Mr. Dana Bailey, an upper atmosphere physicist from ESSA. The ship made a call at the new Soviet station on King George Island (see note on next page).

Now wintering over at the Soviet station Molodezhnaya is Dr. LeRoy Scharon, a geophysicist from Washington University, St. Louis. Dr. Scharon is obtaining rock samples for paleomagnetic studies. Early this year, Dr. Scharon visited the new Soviet station in the Antarctic Peninsula region (see note on next page). In March, U.S. exchange scientist Dr. E. E. MacNamara, of the Arctic Institute of North America, who spent the previous year studying soils at Molodezhnaya, departed Antarctica aboard *Ob'*.

In December 1967, Dr. Victor P. Hessler, of the Geophysical Institute, University of Alaska, and Mr. John Taylor, of ESSA, flew from McMurdo Station to the Soviet station Vostok, where they carried out upper atmosphere and terrestrial physics experiments. They also serviced and recalibrated the U.S. equipment at the station. It was Dr. Hessler's fourth visit to Vostok. Mr. Taylor wintered over at the station in 1966 (see *Antarctic Journal*, vol. II, no. 3, p. 64).

USARP personnel also worked in two subantarctic areas. Dr. Henry Imshaug, Mr. John Engel, and Mr. Richard Harris of Michigan State University studied lichens and bryophytes on the Falkland Is-

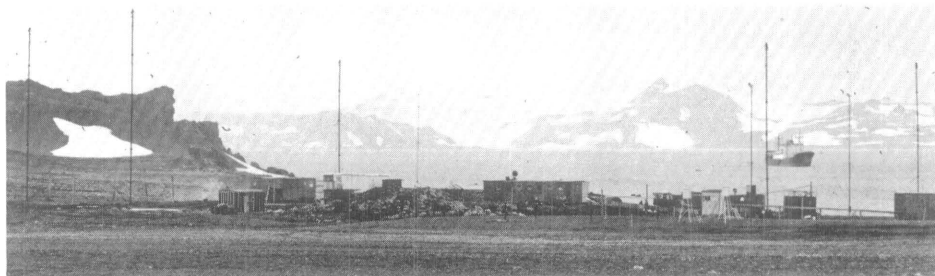
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## U.S. Scientists Visit New Soviet Station

During last austral summer, two U.S. scientists visited the new Soviet station Bellingshausen on Fildes Peninsula, King George Island, in the Antarctic Peninsula region. Dr. LeRoy Scharon, U.S. exchange scientist now wintering over at the Soviet station Molodezhnaya, traveled to the site from Mirny aboard the research ship *Ob'*, one of three vessels

that brought construction personnel and materials to the island, and remained there throughout most of the construction period. Mr. Dana Bailey, U.S. representative aboard the British-chartered resupply ship *Thala Dan*, visited the station with the British party in February.

Bellingshausen was formally established on February 22, 1968. Its complement consists of 11 persons, including meteorologists, an oceanographer, a geographer, and two doctors.



Bellingshausen Station.

(Photo by LeRoy Scharon)

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lands, and Mr. John Annexstad of the University of Alaska conducted a conjugate-point micropulsation experiment in cooperation with the Australians on Macquarie Island.

Dr. William L. Boyd and Mr. Irwin Rothenberg, Colorado State University, joined the Argentines at their Almirante Brown Base, where they studied soil microorganisms (see article in this issue).

Mr. James A. Yeager of ESSA accompanied the Australians during their resupply expedition to Mawson and Wilkes Stations.

### Foreign Exchange Scientists

Two Chileans participated in U.S. antarctic activities. Mr. Oscar González, a volcanologist from the University of Chile, joined the Marie Byrd Land Survey, and Mr. Javier Serrat, an electrical engineer, also from the University of Chile, visited McMurdo and Byrd Stations to conduct tests aimed at improving radio communications between those stations and the Chilean base Presidente Pedro Aguirre Cerda on Deception Island. Mr. Serrat's work was curtailed by the volcanic eruption on Deception.

Mr. P. G. Astakhov, a Soviet upper atmosphere physicist, completed a year of research at South Pole Station and departed the Continent for the U.S.S.R. in February 1968. He was replaced as Soviet Exchange Scientist by Dr. Boris G. Lopatin, of the Institute of Arctic Geology, Leningrad. During the 1967-1968 summer, Dr. Lopatin visited several field parties in the McMurdo area and participated in the Marie Byrd Land Survey. He is spending the winter at McMurdo Station.

Dr. Thor Kvinge, of the University of Bergen, Nor-

way, and his assistant, Mr. Jan Strømme, took part in the International Weddell Sea Oceanographic Expedition aboard the icebreaker *Glacier*. Dr. Kvinge moored four instrumented buoys in the eastern part of the Weddell Sea to record data on temperature, salinity, and currents. The buoys will be recovered upon *Glacier's* return to that area in the 1968-1969 austral summer.

Joining USARP from the University of Witwatersrand, South Africa, was Dr. T. W. Gevers, a geologist who worked with a University of California (Los Angeles) team that investigated tillites in southern Victoria Land.

Glaciologists Dr. William De Breuck of the State University of Ghent, Belgium, and Mr. Yngvar Gjessing of the Norsk Polarinstittutt, Norway, joined SPQMLT III, while Dr. E. E. Picciotto and Mr. Francis Hanappe of the Free University of Brussels, Belgium, collected snow samples at Plateau Station.

Dr. Gordon de Q. Robin, Director of Great Britain's Scott Polar Research Institute, and Drs. Charles Swithinbank and Stanley Evans, also of the Institute, made ice-thickness soundings by radar of large areas of West and East Antarctica. The British sounding equipment was flown in a U.S. Navy C-121J aircraft.

Dr. Robert Carrick, a biologist from the University of Adelaide, Australia, cooperated with a group from Johns Hopkins University in a study of the penguin population at Cape Crozier.

Dr. Bernhard Brockamp of the University of Munster, Federal Republic of Germany, visited with the party surveying the strain network northeast of Byrd Station.

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## Highlights of Late Season Activities



(U.S. Navy Photo)

An LH-34D helicopter creates its own "snowstorm" while landing at Williams Field.

### Introduction

Described here are highlights of the scientific work done between early January and the departure of the last ships from Palmer Station on March 21, and of support operations during the period from January 25 to March 25, when *Glacier* and *Southwind* reverted to the operational control of the United States Coast Guard. Research and support activities during the earlier part of the 1967-1968 season have been summarized in previous issues of the *Antarctic Journal*,<sup>1</sup> and a complete review of the summer scientific program will appear in the next issue, along with articles on selected aspects of the logistic support effort, notably air operations and station construction.

During the period reviewed here, scientists and support personnel alike wound up their summer work. The icebreakers—after being relieved of the necessity of escorting cargo ships through the pack ice—were able to devote considerable time to supporting scientific projects and to logistic chores, particularly at Hallett and Palmer Stations. The helicopters of Air Development Squadron Six (VX-6) continued to aid scientists in the McMurdo Sound area until the final flights on February 20. Meanwhile, the squadron's Hercules aircraft completed the resupply of Byrd, Plateau, and South Pole Stations, and they supplied scientific parties in the field.

<sup>1</sup> Vol. II, no. 6, p. 231-235; vol. III, no. 1, p. 6-10, and no. 2, p. 38-49.

As the season drew to a close, the LC-130s flew summer personnel from the interior to McMurdo Station for further transportation to New Zealand by both Hercules and Super Constellations.

### Air-Supported Activities

On January 26, a party from McMurdo inspected Eights Station, which had been closed since November 1965. When the inspectors (among whom were Captain A. F. Farwell, deputy commander of Task Force 43, and Mr. Jerry Huffman, USARP Representative) stepped from the aircraft, they discovered the station to be buried under 8 to 10 feet of snow. Only radio masts and the top of a tractor were visible. The problem of finding an entrance was solved by the aircraft commander, Lt. Comdr. F. A. Prehn, in a slightly unorthodox manner. While walking about the area, he fell into the station through the aurora dome. Once inside, the inspecting party found the interior free of snow and the equipment in good repair, despite an apology left by the station's last leader: "Departed camp due to low fuel on plane—sorry to leave place in such a mess—couldn't help it."<sup>2</sup>



(U.S. Navy Photo)

Digging an entrance into Eights Station, which had been closed for a little more than two years.

As early as January 14, the first of the remote field parties had been flown back to McMurdo Station. Three scientists from Texas Technological College, led by Mr. J. R. Wilbanks, had spent two and a half months conducting detailed geological investigations in the Fosdick Mountains. A week later, a six-man New Zealand party was picked up in northern Victoria Land after it had devoted 70 days to a geological survey in the area around Rennick Glacier.

<sup>2</sup> Last entry in the station's log for the period from October 30, 1963, to November 14, 1965. This interesting document is now in the library of the U.S. Naval Support Force, Antarctica.

A major scientific project during three of the last four seasons has been the South Pole-Queen Maud Land Traverse. From the beginning, this project has had an international flavor, with Belgian and Norwegian scientists participating with their American colleagues. The principal objective of the traverse has been a glaciological and geophysical investigation of the high polar plateau in Queen Maud Land. During the 1964-1965 and 1965-1966 seasons, the investigators travelled a zig-zag route between the South Pole and a temporary Soviet station at the "Pole of Inaccessibility," and from there to the USA's Plateau Station, respectively. This summer's traverse, under the leadership of Mr. Norman Peddie of the U.S. Coast and Geodetic Survey, left Plateau on December 5 and was picked up at 78°42' S. 06°52' W. between January 29 and 31. The traverse covered 815 miles, over which measurements were made of the Earth's magnetic field and glaciological and geophysical investigations were completed. At one point, the party crossed the trail of a Soviet traverse; the tracks of the Soviet vehicles were still visible after nine months, emphasizing the sparsity of snowfall in the interior of Antarctica.

On the same day that the last members of the traverse party returned from Queen Maud Land, VX-6 began retrieving the equipment from the Marie Byrd Land camps. (Some of the scientists had come back to McMurdo Station earlier in the season). This operation involved dismantling camps 1 and 3, at 75°53'S. 131°45'W. and 75°40'S. 115°W., respectively, and removing the tents from campsite 2, at 76°25'S. 126°51'W. The innovation of sending construction personnel from McMurdo to erect the camps proved quite successful, and the survey's scientific leader, Dr. F. Alton Wade, reported that cooperation between the Army Aviation Unit (Antarctica Support), which operated the survey's three helicopters, and the scientists had been excellent. More than 1,200 miles of topographic survey control were established and 238 sites visited for the collection of specimens and data. Though only three of five planned campsites had been occupied because poor weather hampered operations, Dr. Wade felt that everything that was possible under the circumstances had been accomplished.

Undoubtedly, the highlight of the season for the Ohio State geological party working in the central Transantarctic Mountains was the discovery on December 28 of a fragment of the jawbone of an amphibian that lived 200 million years ago, the first such fossil found in the Antarctic.<sup>3</sup> Two members of the geologic party, Dr. David Elliott and Mr. David Johnston, spent 18 days examining the Jurassic

basalt outcrops that appear in the Grosvenor Mountains between 15 and 65 km south of Otway Massif. The other pair of investigators, Mr. Peter J. Barrett, the leader of the party, and Mr. Ralph Baillie, sledged 100 km northwest, to McIntyre Promontory, where they measured and described 500 meters (about 1,500 feet) of the local strata and observed an outcrop of the volcanic mudflow unit that underlies the Jurassic basalts at Mount Pratt. They then rejoined their co-workers at Mount Block in the Grosvenor Mountains, and the four returned to a prearranged pickup point to await the arrival of a VX-6 Hercules on February 2.

The next day, the last scientific party was brought back from the field—a group of glaciologists from the University of Wisconsin who had been resurveying Roosevelt Island as a follow-up to surveys made during the 1961-1962 and 1962-1963 seasons.

With the scientific parties returned from the field, the emphasis in air operations shifted to completing the resupply of inland stations and redeploying the remaining summer support personnel. The last flight to Plateau Station occurred on February 8; Brockton, the summer weather station on the Ross Ice Shelf, was closed six days later. On February 17, the last Hercules of the season took off from the South Pole, carrying the Commander, Task Force 43, and five members of the New Zealand Defense Board. On the following day, Byrd Station was visited for the last time.

Through most of February, the two Super Constellations continued flying between McMurdo and Christchurch. The last such turnaround flight left Williams Field on February 22, and one day later, the final Hercules flight was made, bringing to a close one of VX-6's most successful seasons.

Even though Hallett Station still awaited evacuation by icebreaker, and—far to the east—ship operations and construction were to continue at Palmer Station into March, the Antarctic Winter-Over Station Unit was activated on February 23, with Commander J. S. McNeely, USN, as commanding officer.

### Field Projects Around McMurdo Sound

Good weather throughout January permitted completion of many summer research projects in the McMurdo area by early February, but the station's helicopters remained available to scientists until February 20. One user of helicopter support was Dr. Boris Lopatin, an exchange scientist from the Soviet Union, who visited the Wright and Taylor Valleys, conducting detailed investigations of a 120-square-kilometer area near Lake Vanda. The Soviet geologist reported observing that biotite-amphibole schists and gneisses on the Dais Mesa give way to biotite-

<sup>3</sup> *Antarctic Journal*, vol. III, no. 2, p. 52.

amphibole granites to the eastward, indicating an ultrametamorphic origin of the latter.

During early February, work in several biological projects was completed for the season. Dr. W. J. L. Sladen of the Johns Hopkins University had left Antarctica in late December, but three assistants led by Mr. Robert Wood continued the ornithological studies at Cape Crozier, including observations of skuas of known ages. During January, 171 previously banded skuas were recorded, and 149 old bands were replaced with new ones of a different design. In addition, 99 chicks were banded. The skua's wide range is indicated by the report that a bird banded at Crozier in December had been seen at Dumont d'Urville Station, having travelled some 2,000 kilometers (about 1,200 miles) in two to three weeks.



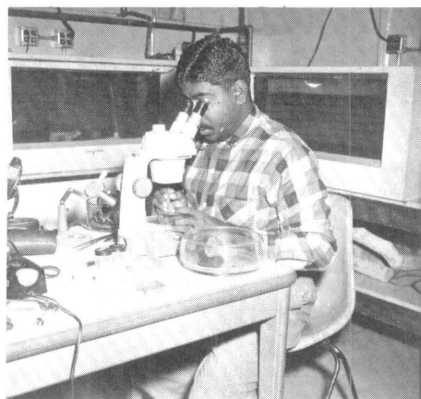
(U.S. Navy Photo)

*Dr. Sladen bands a penguin at Cape Crozier.*



(U.S. Navy Photo)

*Divers measure ice-shelf thickness near McMurdo to determine amount of light reaching underlying water.*



(U.S. Navy Photo)

*Dr. Robert Y. George of Florida State University examines a specimen in the biology laboratory at McMurdo.*

During January, the same party completed the annual banding at Cape Crozier of 5,000 Adélie penguin chicks. The members also made intensive observations of the breeding habits of 140 marked nests of Adélies of known age. It was noted that females predominated among young breeders, and that they were more successful than the males in brooding and hatching eggs. On one occasion, a Weddell seal was seen eating an Adélie fledgling—possibly the first observation of such predation.

Dr. Roy E. Cameron, a microbiologist, led a group from the California Institute of Technology's Jet Propulsion Laboratory in the collection of 29 surface and subsurface soil samples from the dry valleys on two four-day trips. They analyzed some samples in the biological laboratory at McMurdo Station and shipped a ton of frozen soil to their laboratory in California and to other laboratories for further analyses. They also assisted Dr. James Turnock, deputy director of the Apollo program, in the

collection from the dry valleys of uncontaminated soil and rock samples for testing by the Lunar Receiving Laboratory at the Manned Space Flight Center in Houston, Texas.

In the first week of February, Messrs. Donald Bierle and Lauren Schroeder of the University of South Dakota ended their studies of Protozoa. Population and species numbers were counted from about 300 samples of fauna filtered from the waters of a lake in back of Cape Royds. The samples, which were mounted permanently on slides, had been obtained at five-day intervals during a period of eight weeks. Identification of another 6 species of ciliate protozoans raised their cumulative total to about 24. They also obtained soil samples from various sites around McMurdo Sound in order to culture soil protozoans.

All of these projects required field trips by helicopter, as did a physiological study of mosses con-

ducted by Dr. James R. Rastorfer of Ohio State University, who, in a one-month period, collected materials from Hobbs Glacier, Marble Point, Cape Barne, and Miers Valley for study at McMurdo and at Ohio State.

By February 7, the field season was so far advanced that the position of U.S. Antarctic Research Program Representative at McMurdo was disestablished, and its occupant, Mr. Jerry Huffman, departed Antarctica. Mr. Richard Przywitowski of the Environmental Science Services Administration (ESSA) assumed the duties of station scientific leader for the winter.

### Station Scientific Programs

At McMurdo Station, the cosmic ray program of the Bartol Research Foundation functioned normally in January, as did the riometer program of the Douglas Aircraft Company. Equipment for an air-glow study by Dr. M. Gadsden of ESSA was installed, and observations were begun on February 26. The geodetic position for the McMurdo camp area was transferred to a point near the Earth Sciences Laboratory, and several improvements were made to the biology laboratory: a new addition was joined to the main building, and the snowmelter was replaced by a new water system. The laboratory and other station facilities were shown to the first groups of tourists ever to visit McMurdo.<sup>4</sup> The first tour group was also shown through the research vessel *Eltanin*, which called at the station briefly during Cruise 32 (see article in this issue).

At Amundsen-Scott South Pole Station, a U.S. Geological Survey team led by Mr. Merle E. Southern attempted during January to determine the exact location of the station by means of astronomic observations. At present, the station is about one kilometer (0.6 mile) from the geographic South Pole. Such determinations, made at irregular intervals, will help define the movement of the ice, which information may be useful at a future date in calculating the best location for a new station. Other station observations were carried on while new scientific and support personnel were busy receiving and storing equipment and supplies and making the station ready for the winter. The last of the summer personnel departed the station on February 17.

An outstanding event of the season was the successful completion of the drilling program at Byrd Station by engineers from the U.S. Army Cold Regions Research and Engineering Laboratory, as reported briefly in the last issue of the *Antarctic Journal*. The bottom of the ice cap was attained on



(U.S. Navy Photo)

*A worker inspects a section of ice core immediately after its removal from the drill hole at Byrd Station.*

January 29 at 2,164 meters (7,100 feet), a depth considerably less than that calculated earlier from seismic soundings. Between January 18 and February 5, Dr. James R. Barcus of the University of Denver studied cosmic radiation at Byrd Station by means of balloon-borne instruments. During a solar-cosmic event on January 26, the radiation level exceeded galactic background by a factor of 50.

Little information about the progress of summer research has been reported from Palmer or Plateau Stations. At the former, three biological projects were carried on. Dr. Raymond D. Dillon of the University of South Dakota collected Protozoa for comparison with collections made by his assistants in the McMurdo Sound area, and two scientists from the University of California (San Diego), Drs. Edvard A. Hemmingsen and Everett L. Douglas, investigated the physiology of polar animals. Both programs were terminated on February 11.

Dr. Theodore P. Gannutz of Clark University began a study of photosynthesis and respiration in lichens. Dr. Gannutz will continue his work during the winter, when he will also serve as station scientific leader. On March 13, in a message to *Southwind*, he expressed his appreciation for assistance given him by crew members in collecting botanical specimens from islands near Palmer Station. Six islands were surveyed and a large number of specimens obtained.

### Ship Operations

The last supply vessel to need icebreaker escort through the pack ice was USNS *Wyandot*, which arrived at McMurdo Station on January 25. After discharging cargo and backloading equipment, *Wyandot* departed Winter Quarters Bay on Febru-

<sup>4</sup> *Antarctic Journal*, vol. III, no. 2, p. 52.



(U.S. Navy Photo)

*The tanker Alatna rounding Hut Point.*

ary 3, having completed her antarctic assignment for the year. The remaining resupply missions were those of the tankers USNS *Alatna* and HMNZS *Endeavour*. *Alatna*, having suffered damage on her first trip to the Antarctic in December, had to spend time in dry dock for repairs, so she hastened to complete her year's work on time. Turnarounds in Port Lyttelton and at McMurdo Station were cut to a minimum. She arrived at Port Lyttelton from her second voyage on January 29 and left again the next day. With little ice to contend with and no need for escort, she made the transit to McMurdo in seven days, took a day to unload, and returned to Port Lyttelton on February 14. On her fourth and last trip of the season, *Alatna* arrived and departed Elliott Quay in a single day, February 23, having made up all time lost earlier in the season. *Endeavour* made her second run of the season in February, arriving at McMurdo on the 17th and departing on the 20th. The two ships delivered approximately 5.5 million gallons of bulk petroleum products during the season.

The discharge and loading of cargo at McMurdo was, as in all recent years, carried out across Elliott Quay. Signs of undercutting had been discovered earlier, and when the ice was broken out of Winter Quarters Bay, an indentation appeared that made berth 3 unsatisfactory for cargo operations, but the Quay continued to be useable till the end of the season. During the week of February 19, however, a three-day storm resulted in severe damage. The pier area at berths 1 and 2 was severely undercut, and in places 6-foot-wide sections were washed away, making the pier area so narrow that vehicles probably cannot use it. The road near Scott's hut was completely undermined and rendered unsafe. Repairs will have to be effected early next season to restore Elliott Quay.

After completing their escort duties, the icebreakers *Westwind* and *Burton Island* engaged in other activities, including runs to Hallett Station and the support of scientific projects. On January 25, *Burton Island* arrived at Wellington, N.Z., for a brief period of replenishment and crew recreation. That same day, *Westwind* departed McMurdo Station for a brief turnaround at Hallett, where her helicopters delivered and picked up cargo. She was back at McMurdo on January 27 and commenced loading gear and equipment for future scientific investigations. The next day, she again departed McMurdo for Hallett. On board was Dr. Terrance Wilson of Harvard University, who sought seal specimens for embalment and return to the United States for anatomical study. While *Westwind's* landing craft carried 41,000 pounds of cargo from Hallett to the ship—an operation frequently interrupted by drifting ice—the ship's helicopters scouted for seals. A male and a female crabeater were captured in the vicinity of Cape Hallett. With the assistance of the ship's company, Dr. Wilson threw a net over each seal and anesthetized the animal.

After the ship had started its return journey, a message from Hallett reported that a Ross seal, a 600-pound male, had come ashore there and was being held for Dr. Wilson. The observation of a member of this rarely seen species so near a station was in itself an unusual event. Dr. Wilson hurried by helicopter to retrieve the catch. On the way to McMurdo Sound, *Westwind* skirted Coulman and Beaufort Islands and Cape Bird in the hopes that leopard seals might be taken near the penguin rookeries at those locations. Although several were seen, they proved too alert and agile to be apprehended from a helicopter. The commanding officer of *Westwind* concluded that leopard seals could best be hunted with a rifle from a small boat.

From February 5 through 8, *Westwind* supported Project Array, a Naval Oceanographic Office study of currents in McMurdo Sound and off Cape Crozier. Seven current-meter arrays were lowered at selected points, each array consisting of three Geodyne current meters, two mechanically timed release mechanisms, an anchor clamp, and a submerged flotation buoy. The arrays were left submerged for about 11 days each. The objective was to increase the knowledge of McMurdo Sound currents in preparation for the day when research submersibles would be introduced to Antarctica.

While waiting to recover the current-meter arrays, personnel from *Westwind* sounded and charted the shoal off Hut Point where the tourist ship *Magga Dan* had grounded in January. This project was completed on February 16, and the information obtained was forwarded to the Oceanographic Office

and the U.S. Naval Support Force, Antarctica.

That same day, *Westwind* departed McMurdo Station for the last time. The next two days were spent retrieving six of the seven current arrays. After passing Hallett to drop off mail, *Westwind* headed for Hobart, Tasmania, and home. On February 19, she recorded the first sunset since she had arrived in Antarctica in late November.

*Burton Island*, which had returned to McMurdo Station on February 12, tried in vain to recover the seventh current-meter array off Cape Crozier. Between February 15 and 20, she participated in another current-measuring program of the Naval Oceanographic Office. At selected points in McMurdo Sound, underwater parachute drogues were released and tracked to determine current speed and direction at various depths. Each unit consisted of a Styrofoam float from which was suspended a cable weighted by cinder blocks. The drogue was attached just above the blocks. Currents at different depths could be measured by varying the length of the cable. A flag-topped 8-foot aluminum pole protruded from the float, and tracking was done visually.

*Burton Island* remained in Winter Quarters Bay until *Alatna*, the last of the supply ships, departed on February 23. She followed the same day, but, before clearing the antarctic area, occupied 28 ice-prediction stations along the western side of the Ross Sea. At each station, salinity and temperature measurements were made using Nansen bottles equipped with deep-sea reversing thermometers.

The route followed for the ice-prediction stations took *Burton Island* close to Cape Hallett. On February 26, she removed by helicopter the last of the personnel and cargo from the summer station there. This was three days after the final aircraft flight from Williams Field and thus marked the closing of the season in the Ross Sea area.

During the return trip to New Zealand, *Burton Island* supported a Scripps Institution of Oceanography project and delivered spare electronic parts by helicopter to the station on Campbell Island. (Bad weather had prevented *Burton Island* from stopping at Campbell on her way down to McMurdo in February, thwarting an effort to determine the feasibility of supplying this remote outpost by icebreaker rather than by picket ships traveling to and from ocean station).

On the day that *Burton Island* evacuated Hallett Station, USS *Mills* arrived in Dunedin from ocean station. Early in the season, both *Mills* and *Calcaterra* had encountered severe weather and mountainous seas, which had made station-keeping difficult and resulted in some damage to the ships.

During January and February, however, conditions improved markedly. On February 12, *Mills* relieved *Calcaterra* on ocean station, and the latter ship, after stopping at Campbell Island, reached Dunedin the following day, her chores completed for the year. *Mills* left ocean station on February 23, the day of the last flights from Antarctica.

### Antarctic Peninsula Activities

While *Burton Island* and *Westwind* were operating in the Ross Sea, the other two icebreakers assigned to *Deep Freeze 68*, USCGCs *Glacier* and *Southwind*, were busy on the other side of the Continent. On January 20, both ships were at Punta Arenas, Chile, taking on fuel. After six days in port, *Glacier* left for the Weddell Sea by way of Hope Bay at the tip of the Antarctic Peninsula. While there, she made a rendezvous with the Argentine icebreaker ARA *General San Martín* to exchange ice data and scientific information.



(Photo courtesy of Instituto Antártico Argentino)

The Argentine icebreaker *General San Martín*, which participated in the International Weddell Sea Oceanographic Expedition.

*Southwind* left Punta Arenas on January 29 and arrived at Palmer Station on Anvers Island on February 1. Two days later, with a medical evacuee aboard, she left for Ushuaia, Tierra del Fuego, where the Argentines maintain a naval station. The patient was put ashore by ship's helicopter for further transportation to Buenos Aires by Argentine naval aircraft. *Southwind* returned to Anvers Island on February 8, but only briefly. She left two days later for Punta Arenas, waiting there from February 15 to 20 for spare parts and other materials, not all of which arrived. On February 23, she was at Palmer, but left the same day for Punta Arenas, where once again not all the spare parts were on hand. *Southwind* left Punta Arenas on February 28, passed Deception Island, where bad weather

prevented carrying out a planned helicopter reconnaissance, and went on to Palmer Station. Arriving March 3, she remained in the vicinity of Anvers Island until the 11th, then proceeded once again to Punta Arenas, where she arrived on the 14th. She sailed three days later, after taking aboard Rear Admiral J. L. Abbot, Jr., Commander, U.S. Naval Support Force, Antarctica, members of his staff, and Mr. Philip M. Smith of the National Science Foundation, all of whom were to attend the dedication of Palmer Station (see insert on p. 58). On this trip, the delayed reconnaissance of Deception Island was finally carried out, and the effects of the volcanic eruption of December 9 were surveyed. When *Southwind* reached Anvers Island on her last trip of the season, she found *Glacier* already there.

Since the two ships had last met at Punta Arenas in January, *Glacier* had been engaged in an extensive oceanographic survey of the western side of the Weddell Sea. This venture, known as the International Weddell Sea Oceanographic Expedition, was carried out with the cooperation of the Argentine icebreaker *General San Martín*. At one time, the Argentine Navy felt that *San Martín* would have to be withdrawn from the operation, but the icebreaker completed her resupply missions in time to participate in the latter part of the joint venture.

On the expedition, about 50 scientists and technicians from Argentina, Norway, West Germany, and the United States took part in a score of projects over a period of 45 days.<sup>5</sup> During that period, she steamed 4,800 miles and occupied 61 oceanographic stations, although 80 percent of the time she was in heavy ice. *Glacier* was the first ship to penetrate the western portion of the Weddell Sea since the expeditions of Filchner (1911-1912) and Shackleton (1914-1916), both of which had been



(U.S. Coast Guard Photo)

USCGC *Southwind* provided the major support for Palmer Station during the past season.

<sup>5</sup> The expedition's accomplishments will be reviewed in the next issue of the *Antarctic Journal*.

beset in the ice and forced to drift with the pack. In general, *Glacier*, with her modern oceanographic equipment, confirmed the accuracy of observations made during the earlier expeditions. In addition to her oceanographic gear, *Glacier* had on board satellite readout equipment to take advantage of weather, communications, and navigation satellites. It is expected that the investigation of the Weddell Sea will be resumed next season.

Having concluded her oceanographic studies, *Glacier* reached Palmer Station on March 16, where she awaited the arrival of *Southwind*. The latter ship, in addition to her trips back and forth between Punta Arenas, had assisted both the construction effort and the scientific program during the season. Her landing craft and helicopters had ferried personnel, unloaded cargo, and transferred stores and equipment from the old buildings to the new, and shore parties had supplemented the effort of Detachment Alpha of Naval Construction Battalion Unit 201. *Glacier*, on her arrival at Palmer Station, also contributed to this work, so that by March 20—when *Southwind* returned to Anvers Island—the new buildings were already occupied.

The Admiral, his party, and the USARP Representative transferred to *Glacier* before flying over the area and going ashore to inspect and dedicate the facilities. Meanwhile, the ships were embarking construction personnel, scientists, and cargo for return to the United States. *Southwind* also unloaded some miscellaneous supplies and the final mail, which she had picked up at Punta Arenas, and refuelled *Glacier*.

With these preparations completed, *Southwind* got under way at 0620 on March 21. Approximately 20 minutes later, she grounded on a rock pinnacle in an area where the depth of the shallowest water had been charted at 6½ fathoms. During the next five hours, the ship discharged 37,000 gallons of fuel, lowered all boats, and waited for high tide. At 1133, she backed clear and returned to Arthur Harbor for a hull inspection, while *Glacier* stood by to assist if needed. It was discovered that, although extensive damage had occurred, there was no flooding. Considerable reshuffling of passengers and cargo took place before the two ships departed in company at 2100. Starting out at 6.6 knots, *Southwind* soon built up her cruising speed to between 9 and 10 knots. The trip across the often stormy Drake Passage was uneventful, and the ships parted company on March 24 when off the eastern entrance to the Strait of Magellan. *Glacier* pushed ahead with passengers and cargo to be airlifted to the United States. *Southwind* followed, and on March 25 both ships returned to the operational control of the Coast Guard.

# Traverse Support During Deep Freeze 68

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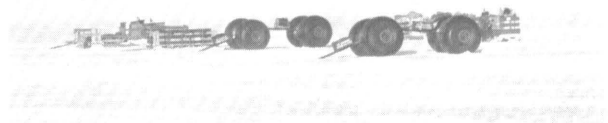
*(U.S. Navy Photo)*

*Drill-equipped Sno-Cat is used to reload some of traverse's equipment into a Hercules.*

On January 30 and 31, 1968, the personnel of South Pole—Queen Maud Land Traverse (SPQMLT) III and some of their equipment were picked up by two Navy LC-130F Hercules which made open-field landings at 78°42'S. 06°52'W., the terminus of this past season's effort. The nine men, one of their three vehicles, and some of their scientific equipment were returned to McMurdo Station, where the model 743 Sno-Cat, which had been fitted with an ice-coring drill, will be prepared this winter for other uses next season.

The two larger (model 843) Tucker Sno-Cats used by the traverse party as living and laboratory spaces—plus expendable supplies for the vehicles and rolling liquid transporters\*—were cached for the winter at the terminus point. They may be used again, but the fourth portion of the traverse (SPQMLT IV) has been cancelled for at least a year. Recently introduced airborne-sensing techniques now make it possible to measure the thickness of the ice cap and to obtain information on subsurface features from a C-121J Super Constellation flying overhead, thus offering an alternative for some studies to the

\* Rubber fuel cells of 500-gallon capacity. Similar in appearance to oversize tires, they can be mounted on axles and towed in single or multiple units; those used by SPQMLT III were paired.



*(U.S. Navy Photo)*

*Left behind at journey's end were two Sno-Cats and these rolling fuel transporters.*

more tedious classical technique of using a slow-crawling tracked vehicle.

After departing Plateau Station on December 5, the eight-week traverse was dependent on aerial supply drops. Four were made: on December 20, 21, and 29, 1967, and on January 13, 1968. In all, 54,144 pounds of material were delivered. The bulk of this cargo was DFA (Diesel Fuel Arctic): 114 drums of it totaling 46,144 pounds. Other supplies included scientific gear and gasoline for the Sno-Cats' starters and for cooking stoves.

Standard medium-level drop techniques were used, the Hercules reducing airspeed to about 120 knots and ejecting the cargo between 500 and 1,000 feet above the surface. Each pallet bearing six fuel drums was fitted with one cargo parachute, not so much to check the fall as to stabilize the pallet so it would land top side up. A total of 41 cargo parachutes and 3 extraction chutes were used, the latter to help pull the three biggest cargo drops off the open rear ramp of the Hercules. Although the technique is by no means new, a test drop was made at Williams Field to check whether the fuel drums could withstand the impact on ice and snow. During the actual deliveries to the traverse party, the cargo generally sank 2-3 feet into the surface, but only about 10 percent of the traverse supplies were lost or damaged beyond use.

Each supply drop required a 3,000-mile round-trip flight from McMurdo Station. Aircraft commanders for the four flights were Lt. Comdr. R. D. McLin, USN, Lt. R. P. Horne, USN, Major E. D. Noels, USMC, and Lt. Comdr. S. J. Wegert, USN. Aviation Boatswains Mate First Class Charles G. Rogers was dropmaster in charge of organizing and rigging the cargo for the drops.

As is generally the case on the plateau of East Antarctica, weather was good while most of the drops were made, though haze and ice fog sometimes decreased visibility. The traverse party was equipped with a radar-beacon transponder to increase the distance at which the drop aircraft could identify the surface party's location. Though the transponder did not work as well as hoped, the aircraft were still able to pick up the signal at 60 to 80 miles.

## Harvard Operates Winter College at McMurdo Station

Sixty-two of the men spending this austral winter at McMurdo Station are enrolled in eight college courses offered by Harvard University and several associated colleges. This "winter college" in Antarctica is part of the Program for Afloat College Education (PACE) sponsored by the Bureau of Naval Personnel.

PACE is a partnership between the Navy and several universities and colleges, including, besides Harvard, the University of Hawaii, the University of South Carolina, and San Diego State College. One of many efforts by the Navy to widen educational opportunities, the PACE program was organized in 1960 so that members of submarine crews on long underwater voyages could earn academic credit toward college degrees. Since then, the program has been expanded until it today includes 10 surface ships and offers a total of 40 courses—25 in the natural sciences, 11 in the social sciences, and 4 in the humanities. Now the program has come ashore at McMurdo, where winter isolation makes a tour of duty similar to an extended sea voyage.

Instruction is accomplished through a combination of kinescoped lectures and "live" classroom sessions. (The only way in which the antarctic version of PACE differs from the original sea-going program is in using the films on shore.) The filmed part of a course usually consists of 15 half-hour lectures which are prepared by an instructor who is both versed in the subject matter and adept at TV-film instruction. The films are followed by group discussions and supplemented by study guides and reading assignments. Although no instructor is available to answer questions, the films have one inherent advantage: they may be partially or entirely rerun to clarify a point in the lecture, or to provide a "make-up" class.

Admission to PACE courses is open to all active-duty Navymen who are recommended by their commanding officers as having the motivation and ability to pursue college studies in their off-duty time. Generally, a minimum of 10 students is required to establish a class, though this may be waived in special circumstances. No tuition is charged (the schools provide the services under contract to the Navy), but the students are required to pay a small registration fee and to purchase their textbooks.

Establishing PACE courses at McMurdo was initially suggested in early 1967, and Antarctic Support

Activities, which operates the station, proceeded to obtain advice from participating units in the vicinity of its Davisville, R.I., headquarters. By September, an agreement had been concluded with Harvard University's Commission on Extension Courses, which arranges for courses to be taught by instructors from Harvard and several other New England schools.

In February 1968, five instructors attached to the Commission arrived at McMurdo to spend five days meeting their students and giving them initial instruction and guidance. Professor Francis Scheid, chairman of the mathematics department at Boston University—and one of the originators of PACE—conducted classes in algebra and calculus. Physics was taught by Prof. J. Gordon Stipe, Jr., also of Boston University. From Simmons College came Prof. Caroll Miles, chairman of the government department, who gave instruction on American government. Prof. Frank Freidel of Harvard's history department conducted classes in American history, and Mr. David Cudhea, managing editor of *Harvard Today*, taught expository English and American literature.

When winter came, the students—many of whom had signed up for several courses—were left with the films, their textbooks, study guides, and reference books. They will also be assisted by the station's officers until the instructors return at the beginning of *Deep Freeze 69* to review the course content and to administer final examinations.

Course grades will be reported by the instructors to their schools, from which official transcripts may be obtained at a later date, and to the station's educational services officer, who will issue certificates of completion to go into the military service records of successful students. Prospects for a high percentage of completions and good grades are bright: the PACE instructors regard their McMurdo students as eager and enthusiastic.

The transferability of credits to other colleges and universities is, of course, a matter for each institution to decide when a student applies for admission, but one of the primary features of the PACE program is the effort by the Navy and the highly regarded participating schools to offer courses which are most likely to be acceptable to other schools for full credit toward an associate or baccalaureate degree.

The introduction of college instruction through PACE has not given McMurdo a campus atmosphere, but there almost certainly will be a new kind of note on many calendars when next spring promises resumption of intercontinental flights: "Study for finals."

## Eltanin Cruise 32

*Eltanin* departed Dunedin, New Zealand, on December 30, 1967, and proceeded southward into the Ross Sea for the second time in her six years of operations in the Southern Hemisphere. An extensive survey was conducted of the western Ross Sea between Cape Adare and Ross Island. A brief stop was made at McMurdo Station on January 23, after which the ship steamed eastward to Kainan Bay, completing a series of stations within about a quarter of a mile of the edge of the Ross Ice Shelf. Shortly after leaving Kainan Bay, further progress to the east was halted by heavy pack ice, preventing a planned survey in the area immediately north of

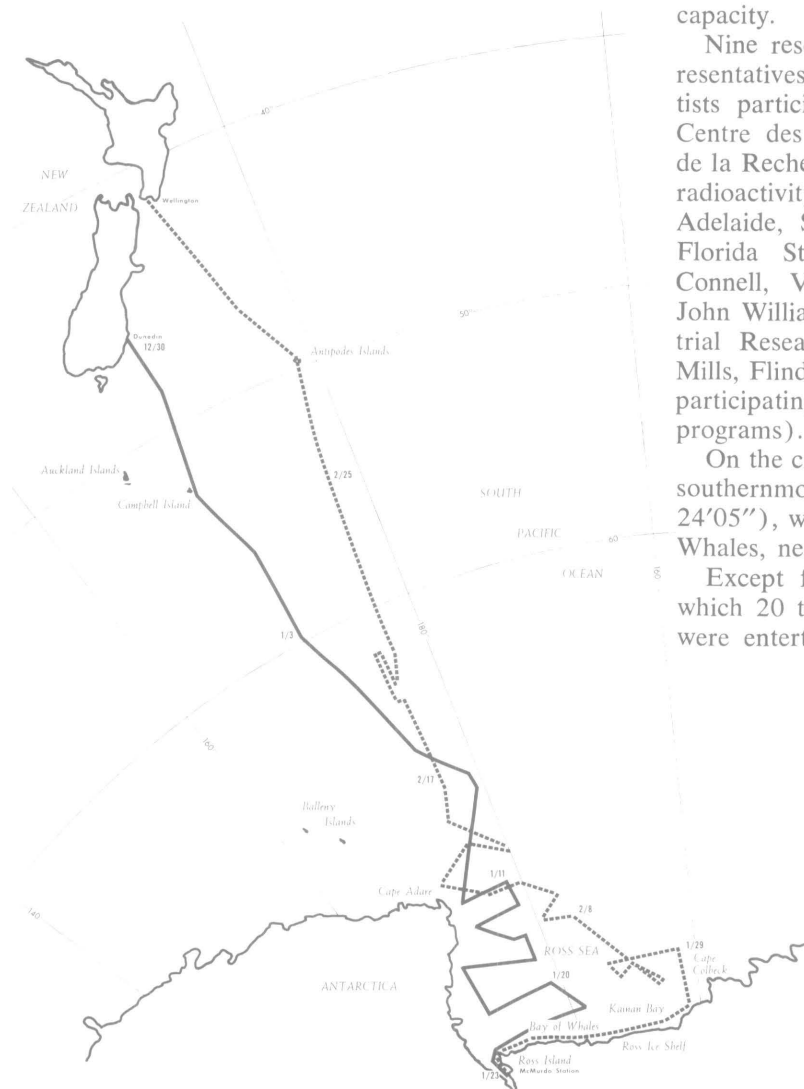
Cape Colbeck. As an alternative to that work, several north-south transects were made in the sparsely surveyed eastern Ross Sea. The ship then returned to the Cape Adare area to occupy several stations that had not been accessible on the southward leg due to ice conditions. *Eltanin* dropped anchor at Wellington, New Zealand, on February 29, 1968, having logged 8,864 miles during the 62-day voyage. Although several stations could not be occupied because of heavy sea ice, the cruise was regarded as highly successful.

Aboard the ship were 33 scientists and support personnel and an MSTS crew of 49 under Master Richard E. Thornton. Mr. Kendall N. Moulton of the Office of Antarctic Programs, National Science Foundation, served as the U.S. Antarctic Research Program representative. It was the third *Eltanin* cruise on which Mr. Moulton has served in this capacity.

Nine research programs were conducted by representatives of 12 institutions. Five foreign scientists participated: Dr. Daniel Nordemann, of the Centre des Faibles Radioactivités, Centre National de la Recherche Scientifique, France, who measured radioactivity; Mr. Chris Curnow, University of Adelaide, South Australia (who worked with the Florida State University group); Mr. Michael Connell, Victoria University, New Zealand; Mr. John Williams, Department of Scientific and Industrial Research, New Zealand; and Mr. Desmond Mills, Flinders University, Australia (the latter three participating in the Lamont Geological Observatory programs).

On the cruise, *Eltanin* improved her record for the southernmost point attained to 78°31'03" (at 164°24'05"), where she nosed into the ice at the Bay of Whales, near the site of four Little America bases.

Except for the brief stop at McMurdo, during which 20 tourists from the cruise ship *Magga Dan* were entertained aboard *Eltanin*, no landings were



*Eltanin's track, Cruise 32. Solid line indicates Dunedin-to-McMurdo leg, and broken line indicates McMurdo-to-Wellington leg.*

(NSF Drawing)

made. Planned biological trawling and inshore collecting at the Antipodes Islands on the return trip had to be curtailed due to inclement weather and accompanying heavy seas. A few hours prior to the ship's arrival at Wellington, she encountered a distressed yacht (*Geraldine*), with two persons aboard. The small vessel, which was out of fuel and adrift in the heavy seas, had been missing for several hours and feared lost in the storm. *Eltanin* stood by *Geraldine* until a rescue vessel arrived to tow the yacht back to Wellington.

The following scientific programs were conducted:

A group of biologists from the University of Southern California collected organisms at 109 locations (at 59, by Blake trawls; at 25, by Isaacs-Kidd midwater trawls; and at 25, by bottom grabs). Of particular interest was the collection in the Ross Sea of three species of skate (*Raja*), 35 species of sea anemones (only 9 had been reported previously from the Ross Sea), and specimens of *Corallimorphus*, a genus not previously reported from the Ross Sea.

In cooperation with the University of Southern California's program, a Harvard University biologist collected 3,600 brachiopods from the Ross Sea—probably the largest number ever taken in antarctic waters. At least another 1,500 specimens were collected north of the Ross Sea.

Also working in conjunction with the University of Southern California party was a University of Miami biologist interested chiefly in cephalopods. To the extent possible, the organisms collected for this study were kept alive in aquaria aboard ship to record their color, luminescent organs, and behavior. As many as 45 live cephalopods were under observation at one time. The cephalopod collection included 146 octopi and 35 squid.

Lamont Geological Observatory of Columbia University conducted two programs, one involving gravity, magnetic, and seismic-reflection measurements, and the other a hydrographic study. The gravity and magnetic records were continuous and of good quality. Seismic profiling was interrupted frequently by the sea ice. In the hydrography program, 115 stations were occupied to obtain salinity-temperature-density (STD) measurements, and 172 surface-activated multiple samplings were made, providing a second set of measurements for comparison with the STD data. Also, 36 camera stations were occupied, providing bottom photographs and data on bottom currents and light scattering. As usual, the bottom photographs were turned over to the Smithsonian Oceanographic Sorting Center for processing and distribution.



(Lamont Geological Observatory Photo)

Tripod-supported bottom camera, current meter, and nephelometer operated by Lamont Geological Observatory on Cruise 32.

As part of a marine geology program carried out by Florida State University, 52 piston cores averaging 4.75 m in length (the longest was 16.89 m) and 44 trigger cores were taken from the ocean bottom. The geologists also collected gravity cores at most stations. From the University of Southern California's trawls and grabs, 40 collections of rock samples were made available to the Florida State program.

Meteorologists from the Weather Bureau launched 55 radiosonde balloons to an average altitude of 28,064 m and a maximum of 35,184 m, as well as 14 rawinsonde balloons to an average altitude of 10,196 m and a maximum of 17,060 m. They also made 235 surface observations, and they sampled carbon dioxide at 9 stations for the Scripps Institution of Oceanography.

In a study of primary productivity (by the  $C^{14}$  uptake method), particulate and dissolved organic carbon, and plankton, a Texas A&M University party occupied 37 stations in the Ross Sea and took 6 surface samples while the ship crossed the Antarctic Convergence. Vertical phytoplankton hauls were made between the surface and a depth of 200 m to determine the relationship between plankton occurrences and  $C^{14}$  values.

## Notes

### Navy Museum Acquires La Gorce Medal for Antarctic Collection

The U.S. Navy Memorial Museum, located in the Washington Navy Yard, has received a replica of the John Oliver La Gorce Medal awarded to the American Antarctic Mountaineering Expedition (1966-1967) by the National Geographic Society. The medal was recently provided for the museum's polar exploration exhibit by the Society's president, Dr. Melvin M. Payne, and the chairman of its board of trustees, Dr. Thomas W. McKnew. The donation was accepted by museum director Capt. Roy C. Smith, III, USN (Ret.), and Capt. Kent Loomis, USN (Ret.), Navy Historical Department representative.



(U.S. Navy Photo)

Dr. Payne hands medal to Capt. Smith as Dr. McKnew and Capt. Loomis look on.

The Society bestowed the original gold medal upon the Expedition on March 31, 1967, in Constitution Hall,<sup>1</sup> Washington, D.C., in recognition of "contributions to science and exploration through the first ascent of Antarctica's highest mountains."<sup>2</sup> Expedition leader Nicholas B. Clinch received the medal from the Honorable Earl Warren, Chief Justice of the United States and a member of the Society's board of trustees since 1955. Bronze replicas, like that now in the Navy Museum, were given to the nine other climbers (all but one of whom were present at the ceremony) and to three organizations associated with the endeavor. Accepting for the American Alpine Club, which had se-

<sup>1</sup> Where in 1935 the Society had welcomed Admiral Byrd back from his second antarctic expedition.

<sup>2</sup> Described in the *Antarctic Journal*, vol. II, no. 2, p. 48-50.

lected the climbing team, was club president Lawrence G. Coveny; for the National Science Foundation, which had coordinated the effort, Dr. Thomas O. Jones; and for the U.S. Navy, which had provided logistical support, Admiral Horacio Rivero, Vice Chief of Naval Operations.

The medal bears the name and likeness of John Oliver La Gorce, a past president of the National Geographic Society. It was designed by Dr. Payne while he was executive vice president of the Society, and executed by Peter V. Bianchi and Howard E. Paine. The reverse design is based on a photograph of an unidentified square-rigged sailing ship photographed by Dr. La Gorce in 1920. Dr. La Gorce, who died in 1959, was postmaster of Little America for Byrd's 1933-1935 expedition. The La Gorce Meteorological Station established by the first (1928-1930) Byrd expedition was named for him, as are La Gorce Peak, in the Alexandra Mountains, and the La Gorce Mountains.

The antarctic exhibit of the Navy Memorial Museum includes the small hut—set up 123 miles south of Little America II as an advance weather station—that Admiral Byrd occupied alone in the winter of 1934. The museum is open from 9 a.m. to 4 p.m. on weekdays, and from 10 a.m. to 5 p.m. on Saturdays and Sundays.

### Mountain Range Named for Operation Deep Freeze

In its meeting on August 31, 1967, the Advisory Committee on Antarctic Names recommended to the Board on Geographic Names that a mountain range about 200 miles north-northwest of McMurdo Station—at 74° 15'S. 163° 45'E., in Victoria Land—be named the Deep Freeze Range. This recommendation received the approval of the Secretary of the Interior on February 29, 1968.

In a related action, a range slightly to the southwest (at 74° 15'S. 162° 15'E.) was designated the Eisenhower Range. As President of the United States, Dwight D. Eisenhower had pledged governmental support of U.S. participation in the International Geophysical Year and directed the Department of Defense to provide logistic support for the antarctic portion of the program.

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*In this view westward from the Ross Sea, the Eisenhower Range appears at top, separated (at upper right) from the Deep Freeze Range by the Priestley Glacier. Gerlache Inlet and Campbell Glacier Tongue are in foreground.*

## John T. Wilson to Leave NSF

On October 1 of this year, John T. Wilson, Deputy Director of the National Science Foundation since 1963, will become Vice President and Dean of Faculties of the University of Chicago. He had left that University on July 1, 1963, to accept his present position at NSF. For six years before going to Chicago in 1961, Dr. Wilson was Assistant Director for Biological and Medical Sciences at NSF.

## NSF Antarctic Film Available on Loan

The new NSF film *On the Ice* is now available for showing. The half-hour color movie depicts field activities of the U.S. Antarctic Research Program. Requests for free loans should be addressed to Sterling Movies, U.S.A., Inc., 43 W. 61st Street, New York, New York 10023. Alternative dates for showing should be indicated in case the film is not available for the dates requested.

## Folio 9 of Antarctic Map Folio Series

Folio 9 is entitled *Magnetic and Gravity Maps of the Antarctic* and was prepared by J. C. Behrent (U.S. Geological Survey) and C. R. Bentley (University of Wisconsin). The 9-plate folio is for sale at \$4.00 a copy from the American Geographical Society, Broadway at 156th Street, New York, New York 10032.

## Volume Published on Polar Meteorology

The proceedings of the Symposium on Polar Meteorology, held in Geneva in September 1966 (cf. *Antarctic Journal*, vol. II, no. 1, p. 17-18), have been published as Technical Note No. 87 of the World Meteorological Organization (WMO). The 540-page volume, entitled *Polar Meteorology* and containing 31 scientific papers, is available at Sw. fr. 78.- from the WMO Secretariat, Avenue Giuseppe-Motta 41, Geneva, Switzerland.



(U.S. Navy Photo)

## **New Issue of SAE Information Bulletin**

Vol. 6, no. 3 of the *Soviet Antarctic Expedition Information Bulletin* has been issued. This 83-page issue contains English translations of bulletins no. 59 (1966) and 60 (1967). Translated from the original Russian under a grant from the National Science Foundation, the *Bulletin* is for sale at \$7.50 per issue by the American Geophysical Union, Suite 435, 2100 Pennsylvania Avenue, N.W., Washington, D.C. 20037.

The entire sixth volume, which will include bulletins 55-66, is available on subscription for \$40. Volumes 4 and 5 are available for \$36 each.

## **International Weddell Sea Oceanographic Expedition**

The first season of the International Weddell Sea Oceanographic Expedition was successfully completed on March 15. A full review of the expedition's accomplishments will be presented in the July-August issue of the *Antarctic Journal*.

## **Review of Soviet Antarctic Expeditions Available in English Translation**

A. V. Nudel'man's comprehensive review of Soviet antarctic expeditions 1961-1963 has been translated for the National Science Foundation by the Israel Program for Scientific Translations. The 220-page translation (originally published in Russian in 1965) is available at \$3.00 a copy from the Clearinghouse for Federal Scientific and Technical Information, U.S. Department of Commerce, Springfield, Virginia 22151. Order by number: TT67-51403.

## **Symposium on Antarctic Glaciology**

The International Symposium on Antarctic Glaciological Exploration (ISAGE) will be held at Dartmouth College, Hanover, New Hampshire, September 2-7, under the sponsorship of the SCAR Working Group on Glaciology with the support of the IUGG-IASH Commission of Snow and Ice. The symposium will deal with the following topics: glaciological techniques (geochemical, geothermal, core studies, etc.); ice sheet dynamics, including heat and mass balance; ice shelves; sea ice; glacial meteorology; and related Quaternary studies.

Further information may be obtained from Dr. John B. Lyons, ISAGE Local Committee, Box 555, Dartmouth College, Hanover, N.H. 03755.

## **Ice-Core Samples to be Made Available for Study**

As noted in the March-April issue of the *Antarctic Journal*, a nearly continuous ice core has been recovered from the 2,164-m borehole at Byrd Station. The core is about 10 cm in diameter and is cut into approximately 1.5-m lengths.

The U. S. Army Cold Regions Research and Engineering Laboratory (CRREL), Hanover, New Hampshire, is responsible for certain phases of the analysis, storage of the samples in the United States, and distribution of core material to scientists collaborating in the analysis. About 124 m of core samples, including the bottom 4.9-m section with its entrapped debris, are now at CRREL and available for immediate study by approved investigators. In January 1969, it is planned to ship to the United States approximately 460 m of core, constituting every fifth 1.5-m section. If core material in longer contiguous sections is required for a given experiment, it will be necessary that the specific requirement be known by August 1, 1968, if it is to be included in the January 1969 shipment.

Scientists interested in obtaining core samples or samples of contained volcanic ash, cosmic particulates, etc., should address their requests to the Chief Scientist, Office of Antarctic Programs, National Science Foundation, Washington, D. C. 20550.

## **Deep Freeze Reunion**

A reunion of former and present antarctic program personnel is planned for June 26, 1968. To be held at the Chief Petty Officers' Club in the Washington (D.C.) Navy Yard, the evening event will honor the memory of the late Rear Admiral Richard E. Byrd. Rear Admiral J. Lloyd Abbot, Jr., the current *Deep Freeze* commander, and Dr. T. O. Jones, Special Assistant for Antarctic Affairs to the Director of the National Science Foundation, will attend. Among the honored guests will be the four earlier commanders of the U. S. Naval Support Force, Antarctica: Rear Admirals George J. Dufek, 1955-1959; David M. Tyree, 1959-1962; James R. Reedy, 1962-1965; and Fred E. Bakutis, 1965-1967.

Music for the dinner-dance will be provided by the U. S. Navy Band. All military and civilian personnel who have participated in U. S. antarctic operations since 1955, and their wives, are invited. For reservations and further information, write: *Deep Freeze Reunion*, c/o U. S. Naval Support Force, Antarctica, Building 210, Washington Navy Yard, Washington, D. C. 20390.

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