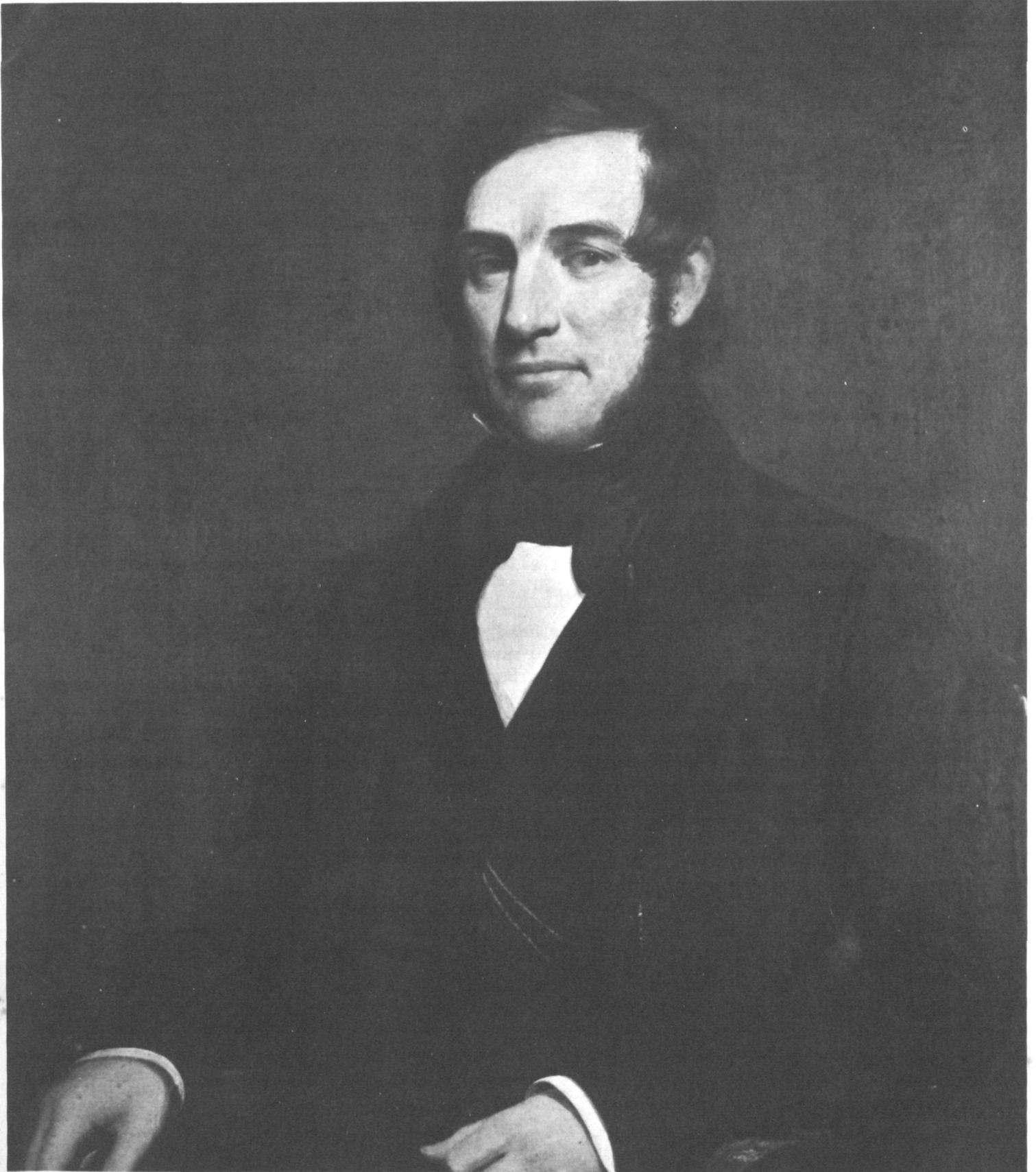


12-70
THE POLAR TIMES



Captain Nathaniel Brown Palmer

National Oceanic and Atmospheric Administration

The Polar Times

ERRATA NOTICE

One or more conditions of the original document may affect the quality of the image, such as:

Discolored pages
Faded or light ink
Binding intrudes into the text

This has been a co-operative project between the NOAA Central Library and the Climate Database Modernization Program, National Climate Data Center (NCDC). Permission to image The Polar Times magazine was granted to the NOAA Central Library by the magazine's Managing Editor on July 14, 2010. To view the original document, please contact the NOAA Central Library in Silver Spring, MD at (301) 713-2607 x124 or Library.Reference@noaa.gov

HOV Services
Imaging Contractor
12200 Kiln Court
Beltsville, MD 20704-1387
August 6, 2010



*The Danish Heir
to the Throne
and Prince Henrik
on a 6,000-mile tour
of Greenland.*

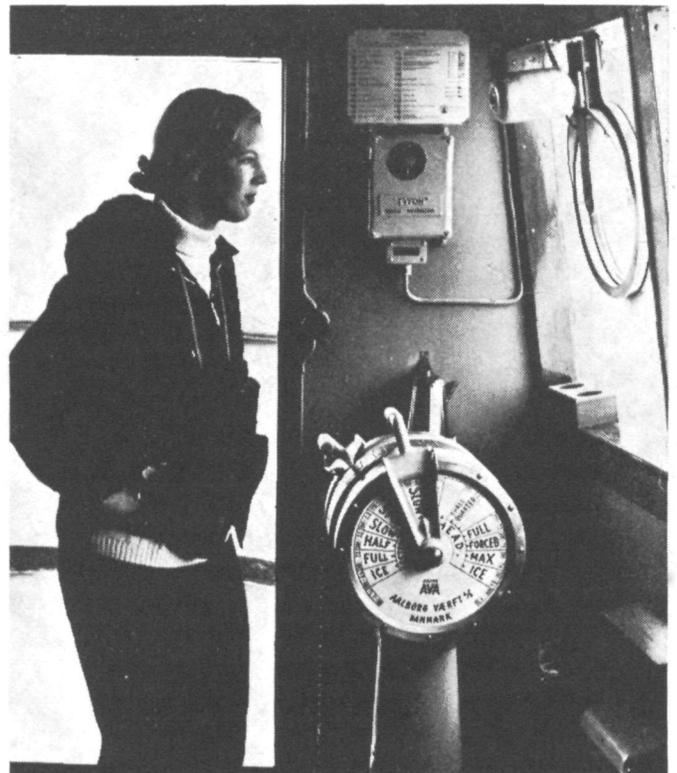
Princess Margrethe, Danish Heir to the Throne, and Prince Henrik travelled over 6,000 miles when they visited Greenland in the second half of July and first half of August, their itinerary including a number of Greenland towns and settlements.

The royal couple flew from Angmagssalik to Akureyri and then sailed to Scoresbysund in one of the Company's ships, the THALA DAN, living on board during their stay in Scoresbysund.



Prince Henrik studies a book of ice charts with Captain Hans Nielsen.

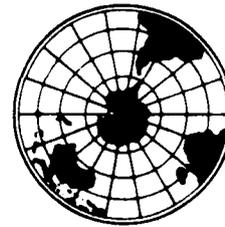
J.L.NEWS



During the voyage Princess Margrethe showed a keen interest in life on board the THALA DAN. Here she is seen visiting the bridge.



American Polar Society



AUGUST HOWARD, SECRETARY
88-20 82nd DRIVE (APT 7H)
REGO PARK, NEW YORK 11374
(212) TWining 6-6892

The Polar Times

Winter 1971

DR F ALTON WADE
President

DR THOMAS C POULTER
CAPT FINN RONNE
DR JOHN H ROSCOE
WALTER SULLIVAN
Vice Presidents

AUGUST HOWARD
Secretary

DR WILLIAM O FIELD
Treasurer

Board of Governors

ROBERT B ATWOOD
PROF WILLIAM S BENNINGHOFF
LOUISE A BOYD
DR RICHARD L CAMERON
R ADM GEORGE DUFEK, U.S.N. (RET)
R ADM ROBERT A J ENGLISH, U.S.N. (RET)
HERMAN R FRIIS
EDWARD E GOODALE
DR LAURENCE M GOULD
ARNOLD M. HANSON
ROBERT J.R. JOHNSON
DR WALDO K LYON
CAPT DAVID C. NUTT
DR NED OSTENSO
GERALD PAGANO
CHARLES E PASSEL
DR MARTIN A. POMERANTZ
DR ALAN H SHAPLEY
CHARLES H STOLL
R ADM CHARLES W. THOMAS, (RET)
PROF NORBERT UNTERSTEINER
DR H BRADFORD WASHBURN, JR

Recent POLAR TIMES issues
at 50 cents each from the
Secretary:

- No. 40 June 1955
- No. 41 Dec. 1955
- No. 42 June 1956
- No. 45 Dec. 1957
- No. 47 Dec. 1958
- No. 48 June 1959
- No. 49 Dec. 1959
- No. 50 June 1960
- No. 51 Dec. 1960
- No. 52 June 1961
- No. 53 Dec. 1961
- No. 54 June 1962
- No. 55 Dec. 1962
- No. 56 June 1963
- No. 57 Dec. 1963
- No. 58 June 1964
- No. 59 Dec. 1964
- No. 60 June 1965
- No. 61 Dec. 1965
- No. 62 June 1966
- No. 64 June 1967
- No. 65 Dec. 1967
- No. 66 June 1968
- No. 67 Dec. 1968
- No. 68 June 1969
- No. 69 Dec. 1969
- No. 70 June 1970

Honorary Members

GENERAL DAVID L BRAINARD 1936-1946
ADMIRAL RICHARD E BYRD, 1938-1957
DR VILHJALMUR STEFANSSON 1940-1962
DR LINCOLN ELLSWORTH, 1944-1951
PROF. FRANK DEBENHAM, 1949-1965
DR. PAUL A. SIPLE, 1957-1968
LOUISE A BOYD, 1959
CAPT FINN RONNE 1960
COL BERT BALCHEN, 1966
DR. LAURENCE M GOULD, 1969

Dear Member:

No. 71 of THE POLAR TIMES marks the 150th anniversary of the discovery of Antarctica by publishing the late Col. Lawrence Martin's article, "Antarctica Discovered By A Connecticut Yankee, Captain Nathaniel Brown Palmer", through permission of the American Geographical Society, Broadway at 156th Street, New York, N.Y., 10032.

That Society has just revised its map of Antarctica at the scale of 1:5,000,000. In 3 colors it shows glaciers, mountains, ice surface elevations, tracks of oversnow traverses and active scientific stations; also the bathymetry of the coastal waters. It measures 42 by 56 inches, has 3 inset maps and sells for \$5.00. Please order direct from the American Geographical Society.

The cost of printing and mailing THE POLAR TIMES in its present size has risen sharply in the past few years. Your Board of Governors is studying the problem and expects to announce its decision with the June 1971 issue.

Now is the time for each member to do his best to strengthen the Society. If you are due to renew now (a card and reply envelope are enclosed for those involved) please do so promptly. Followup letters are costly. Please do your best to enroll one or more new members at the present dues rate. Gift memberships are welcome. Perhaps you may wish to enroll your local library or school library.

We also need your help with printed polar material for reuse in THE POLAR TIMES. Two copies are needed if the material is printed back to back. We need to know name of periodical and date of issue. This will enable us to have a more complete report. Your President and Secretary invite your views and recommendations. Please send the Secretary names and addresses of persons you believe may be interested in membership.

Unbound sets of THE POLAR TIMES (10 numbers to a set) are \$5.75. Single issues are 50 cents. All but 4 issues are available. Issues 1 through 25 cover 1935 through 1947. Other issues are listed on the left. Please send your order with remittance to the Secretary. Thank you for your continued interest and support.

Sincerely yours,
F. Alton Wade, President

The Polar Times

Copyright 1970 by the American Polar Society

No. 71

DECEMBER 1970

SEA LIFE PICTURED ON ARCTIC BOTTOM

Photo Hints Effects of Cold
on Starfish Is Negligible

SUITLEND, Md.—A scientist at the United States Naval Oceanographic Office has presented photographic evidence to show that marine life will flourish almost anywhere — even in near-freezing conditions on the bottom of Arctic waters.

"Here, we have a picture of brittle stars and starfish living on the sea floor at a point about 30 miles west of Franz Josef Land," said Joseph H. Kravitz, the geologist who took the photograph.

Sailing abroad the Navy icebreaker *Atka*, Mr. Kravitz and five other oceanographers reached the far northern point in early autumn, when the Arctic ice pack surrounding the Franz Josef Land islands—all of which lie above Western Russia in the Barents Sea—yields somewhat to warmer temperatures.

"But, even then, we had to ward off ice floes and small icebergs called 'growlers' to get this shot," Mr. Kravitz recalled.

The camera system, he said, was lowered approximately 1,000 feet through the water to a vantage point about six to nine feet above the bottom. It was then activated long enough to get the starfish picture and 60 others "before the ice forced us to cut the camera run short and abandon the site."

The starfish picture, Mr. Kravitz noted, shows the marine animals to be living on a rather smooth, tranquil bottom in water temperatures determined to be close to the freezing point.

The picture may be a first, for, according to Mr. Kravitz, it may represent "the first time scientists have ever used a camera aboard an icebreaker, or any surface ship for that matter, to photograph the ocean floor this far north, although photographs of the Arctic Basin have been taken from floating ice islands."

U.S. and Soviet Press Studies of a Colder Arctic

By WALTER SULLIVAN
The New York Times

July 18

The United States and the Soviet Union are mounting large-scale investigations to determine why the Arctic climate is becoming more frigid, why parts of the Arctic sea ice have recently become ominously thicker and whether the extent of that ice cover contributes to the onset of ice ages.

The projects, which involve nuclear submarines, earth satellites, aircraft and numerous manned and unmanned stations on the drifting ice, are being pressed with special urgency in view of recent discoveries of important resources in the Soviet and the American Arctic.

These include gold and other ores on the Taimir Peninsula, the northernmost part of Siberia, and one of the world's richest oil fields on the North Slope of Alaska.

Because of increased ice along the north coast of the Soviet Union and in view of heavier demands for late-season shipping, the Soviet Ministry of Shipbuilding is studying plans for a series of new icebreakers.

The icebreakers would be half again — or even twice — as powerful as the *Lenin*, the world's most powerful. Driven by nuclear reactors, the *Lenin* has 40,000 horsepower. The new ships may be driven by diesel-electric or gas turbine engines.

The American plan, which is being developed by the University of Washington with support from the National Science Foundation, is known as AIDJEX, for Arctic Ice Dynamics Joint Experiment. An area of the pack ice some 300 miles square would be studied intensively.

The Soviet plan is known as N.E.I. for Natural Experiment on Interactions. It seeks an understanding of factors that control how much energy enters the Arctic via winds, ocean currents and sunlight

and how much is lost to space. The Russians now have four manned research stations on drifting Arctic ice.

The N.E.I. project, which is scheduled to last at least seven years, would also operate two dozen unmanned stations on the ice. Five special weather ships would be added to ships of the international weather program that occupy stations further south.

Such ships, according to the Soviet polar specialist, Dr. Aleksei F. Treshnikov, can fire rockets to monitor upper-air winds.

In addition, Soviet ships are to monitor the two "warm water faucets" that feed the Arctic Basin. These are the Bering Strait and the passage between Norway and Greenland.

Dr. Treshnikov heads the Arctic and Antarctic Research Institute in Leningrad. He was interviewed during his visit Thursday to Columbia University's Lamont-Doherty Geological Observatory at Palisades, N. Y.

Among his hosts there was Dr. Kenneth H. Hunkins, who, with Dr. Norbert Untersteiner of the University of Washington, originated the American project. Both have worked in drifting stations on the Arctic ice.

Director of the multimillion-dollar, six-year United States project, which in its most intensive period, in 1972 or 1973, will involve many Government agencies, is Col. Joseph O. Fletcher of the Rand Corporation in Santa Monica, Calif.

In 1952, Colonel Fletcher, then still on active duty in the Air Force, established the first American drifting station on an ice island known as T-3, or Fletcher's Ice Island. An ice island, as opposed to an ice floe, is a flat-topped iceberg that was formed on land or while attached to the coast.

The use of such an ice island as the support base of the American project is considered essential. Air strips on ice floes are subject to rupture when the floes split. Ideally such an island would form the central base, with four unmanned stations spaced 12 miles apart around it.

The ice island, in that case,

will have to be small enough not to have a major influence on typical stresses and strains within the surrounding pack ice. Farther away, forming a square some 60 miles on a side, will be four manned stations on the drifting ice. Beyond them is to be still another ring of six unmanned stations.

Under the influence of wind, ocean currents and the earth's rotation, the floes carrying these stations will continuously change their relative positions. Observations every hour for the inner stations and every two hours for the outer ones are to keep track of these movements.

Nuclear submarines, according to the American plan, will sail back and forth, echoing sonar beams off the undersides of the floes to determine their roughness (and thus their susceptibility to water drag).

Aircraft as low as 500 feet are to sweep the surface with laser beams to determine the extent of pressure ridges and other sail-like features that affect response to wind.

Aircraft and earth satellites equipped with side-scanning radar, infrared sensors and cameras will record the extent of open water and temperature variations.

Recent research suggests that heat flow from the ocean into the atmosphere is 100 times greater through patches of open water than through areas where there is ice cover. Yet estimates of the extent of open water in the pack vary widely (from 1 per cent to 10 per cent).

Relative movements of the ice floe stations will be determined by electronic navigational systems or by monitoring a Transit navigational satellite. This will show to what extent the pack ice is being crushed together or pulled apart under varying conditions of wind and ocean current.

Such knowledge should help in future predictions of navigation conditions and in assessing the variations in escape of oceanic heat to the Arctic air.

Among the hypotheses to be assessed is one that attributes ice ages to the absence of pack ice on the Arctic Ocean. Winds off that ocean are very dry and drop little snow on Northern lands, but if the sea were open the snows would be heavy and ice sheets would be-

in to form, the hypothesis holds.

Such an idea assumes that the ocean, once free of ice, would not soon freeze again. At present, the brilliant snow surface of the pack reflects much solar energy back into space. If the ocean were ice-free, it is argued, this would not occur, and the water would warm up enough to prevent re-freezing.

Other scientists have proposed that, by sprinkling coal dust on the pack, or through other manipulation, it would be possible to melt the ice, open the ocean to navigation and ameliorate the northern climate.

Yet another argument concerns the long-discussed Soviet plan to divert north-flowing rivers southward, irrigating arid lands and checking the steady drop in level of the Caspian Sea. Since these rivers deliver fresh, relatively warm water to the Arctic Ocean, it is feared that their curtailment might induce a new ice age.

Dr. Treshnikov said no river diversion was projected in the next Soviet Five-Year Plan, although studies continue. However, he added, a preliminary examination indicates that a 25 per cent curtailment is unlikely to have any effect, since, from natural causes, flow in the rivers varies 40 per cent from year to year.

A major puzzle is why climate variations of the last century have been more intense in the Arctic than in lower latitudes. During the half-century that ended about 1940 the world climate became warmer, but the effect was particularly marked in such Northern lands as Spitsbergen.

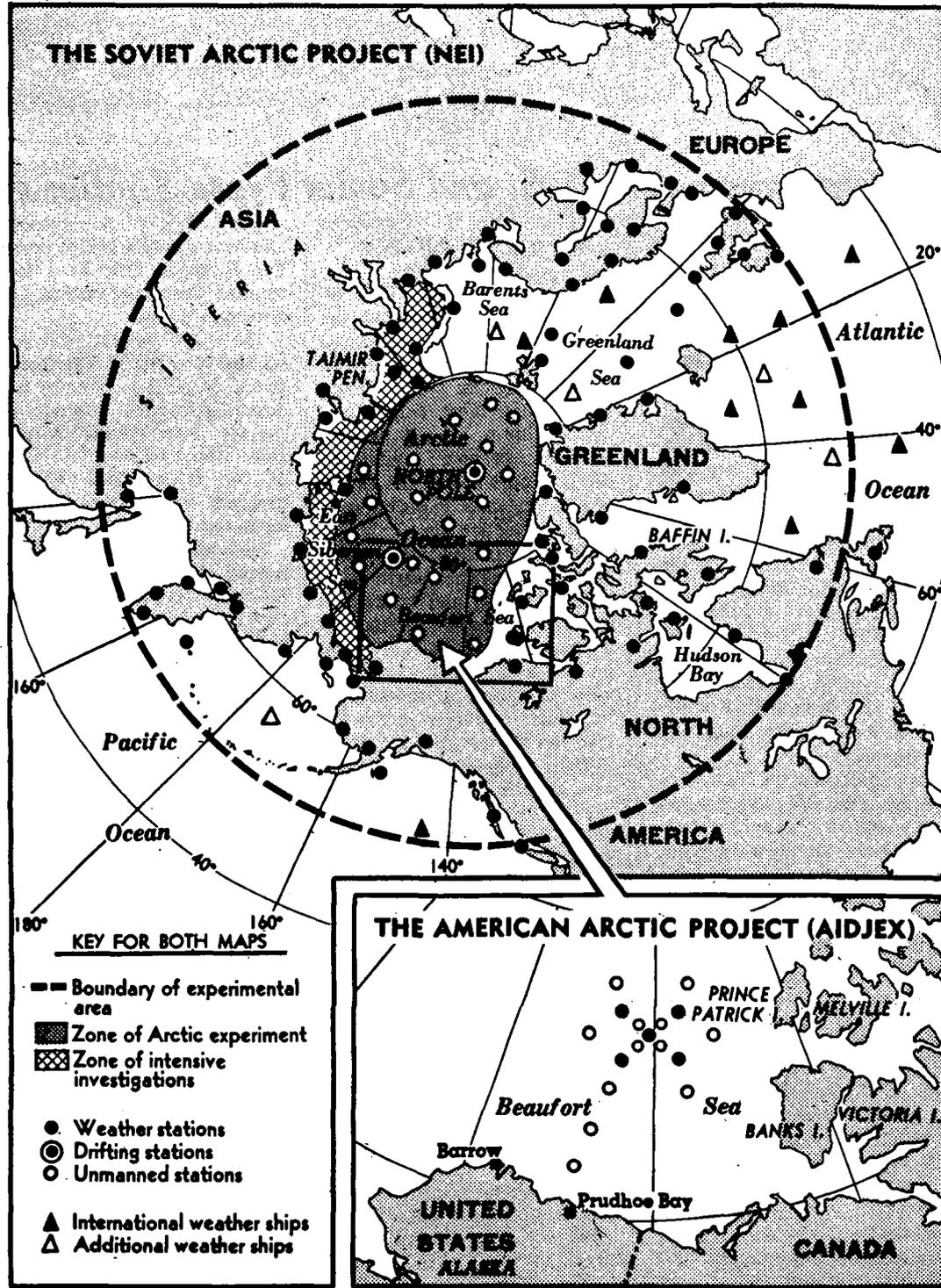
Since then there has been a steady cooling, again most marked in the Far North. Ice conditions off the Soviet coast, said Dr. Treshnikov, have in the last few years been the worst since the twenties or thirties.

There are other weather mysteries, as noted in the prospectus of the Soviet plan.

These include a "warm nucleus" in the atmosphere over the northern Pacific and peculiar repetition cycles of two and six years in air circulation patterns.

While the Soviet and American projects have evolved independently, scientists of both countries have exchanged their plans and found that, to a large extent, they supplement each other.

After Dr. Treshnikov had described his plan to American scientists, Dr. Hunkins said he hoped that there might be an exchange of specialists between the projects, as there is between Soviet and American stations in the Antarctic.



MAJOR ARCTIC RESEARCH: The United States and Soviet Union will explore why the Arctic has recently become colder. Scientists on ships, on drifting ice floes, in aircraft and in nuclear submarines will seek factors that control climate change and, perhaps, initiate ice ages. Worsening ice conditions are impeding access to new Soviet ore deposits on the Taimir Peninsula, and exploitation of oil near Prudhoe Bay, Alaska, depends in part on better predictions of ice movements. In the seven-year Soviet project ships will patrol the Bering Strait and the passage between Greenland and Norway.

College in Alaska Planning A Domesticated Musk Ox

COLLEGE, Alaska (AP) — If experiments at the University of Alaska succeed, Eskimo "cowboys" some day may be

seen riding across the tundra into the midnight sun on the backs of shaggy musk oxen.

That is one of the possibilities being studied at the university's experimental musk ox farm near College as part of a continuing program to domesticate the Arctic beast

for the benefit of man and animal alike.

Officials say the goal is to re-establish the musk ox once hunted to near extinction in Alaska—on its former ranges and to use the new herds to raise the standard of living in the bush.

Alaskans Fear Boom In Oil Will Mar Land

By STEVEN V. ROBERTS

The New York Times

PRUDHOE BAY, Alaska, Aug. 17—Fifty huge barges have been edging their way through the ice-choked Arctic Ocean in recent weeks, hauling supplies to the oil fields here on the North Slope of Alaska.

Along with their cargo of pipes and trucks and timber, the barges have brought with them a thought that is deeply troubling to Alaskans: The development of the oil fields could help destroy precisely what they cherish in their wild and open country.

This lovely land is more than twice as big as Texas and yet has a population—280,000—roughly equal to that of Akron, Ohio.

Its future, how it should face up to the opportunities and the threats of the Industrial Age, has touched off an acrimonious debate between conservationists and developers. In the middle is the great mass of the people, who want both the open land and the new money and who are learning to their sorrow that the two might not be compatible.

"Most people want the oil and the money it will bring," said one political figure. "But most of them are also here because of the difference with other states—the fishing, the scenery, the open space. They have a real split personality, between their interest in developing the state and their interest in preserving it."

Activity has slowed down here on the North Slope, site of the largest oil discovery in North America, while the oil companies wait for a permit to build a pipeline and an adjoining road 800 miles south to the port of Valdez.

Some scattered drilling is going on, but the current delay has already cost tens of millions of dollars, according to one expert, and the companies are reluctant to make further commitments until they know when they can get the oil to market.

The pipe and other cargo now being unloaded will be stored on gravel pads, built up five feet above the spongy tundra,

until word comes from Washington.

Conservationists have been focusing on the immediate problem of producing and transporting the oil. Their main worry is that under severe weather conditions the pipeline might rupture and flood a huge area with oil before the flow could be shut off.

They are worried, too, about pollution of the sea. The oil would be loaded onto tankers at Valdez, on Prince William Sound, one of the state's major salmon fisheries, and shipped south to the Puget Sound Area of Washington.

"There would be 3,000 trips a year by tankers," said Dr. Arlon Tussing, an assistant professor of economics at the Institute of Social, Economic and Government Research in Fairbanks. "Statistically it is almost certain that Prince William Sound and Puget Sound would be continually polluted."

The oil companies, meanwhile, have taken conservation measures on their own. British Petroleum, for instance, collects all of its used oil drums here and flies them back to Fairbanks. Atlantic-Richfield just built a new headquarters with a sewage treatment plant costing \$4-million.

The companies are also studying ways of replanting the tundra, which has been badly chewed up by exploration teams. And they are designing a pipeline that would have minimal effects on the migration patterns of caribou.

"The conservationists are one of the best things that could have happened to us," admitted one oil company executive, who refused to be identified. "We would never be taking the precautions we are if it weren't for the attention focused on us. After all, oil companies are very competitive. We like to think we're socially responsible, but in the long run our aim is to make money. Until recently it was to our advantage to run a sloppy operation because no one was enforcing the rules. Anyone who wanted to be a good citizen did so at his economic disadvantage."

But the immediate problems of the oil industry have led conservationists and others to ask broader questions about the future of Alaska. Should more areas be leased for oil exploration? Should other in-

dustry be encouraged? What will happen when the road accompanying the pipeline opens vast new territory for development? What will be done with the \$900-million already paid the state for oil leases?

Construction companies have bought millions of dollars worth of new equipment. Airlines are leasing cargo planes. Stores have stocked almost any imaginable item that could be used in construction work. The boom has been sidetracked by the pipeline delay, but it is only a matter of time.

"One of the consequences of constructing the pipelines and the roads is that you will build up a very large construction industry," said Robert Weeden, professor of wild life management at the University of

Alaska. "And for their own survival they will keep pressuring the state to build more and more things. After you build a road to the North Slope, what do you do for an encore? That could be really dangerous."

Professor Tussing worries about the fate of the back country that would be open for homesteading and mining claims once the current freeze on distribution of Federal land in Alaska is lifted.

He noted that in order to secure permanent title to his land, a homesteader must clear it and plant a crop or a miner must show that the land contains minerals. "In other words," he said, "in order to obtain free land you have to mess it up. Our current policies encourage that."

Alaska's Interior Airways Files To Reorganize in Oil Slowdown

The New York Times

FAIRBANKS, Alaska, Aug. 9—The Alaskan who built a tiny bush flying service here into the world's largest fleet of Hercules C-130 aircraft, to serve the North Slopes oil exploration boom, said recently he had filed a petition for reorganization proceedings under Federal law.

James S. Magoffin, chairman of the board of Interior Airways, said the action was a result of the delay in the issuance of a construction permit for the proposed Trans-Alaska Pipeline and the resulting slowdown in drilling activity on the North Slope.

A major national company has tentatively agreed to finance Interior Airways during a reorganization period, he added.

The concern will continue to provide normal service, and the action does not mean that Interior Airways is in liquidation, Mr. Magoffin said. "It has simply asked the Federal court to provide it with the protective cloak of the Federal laws pending reorganization."

Mr. Magoffin and his wife, Dorothy, both pilots, began their flying business in the post-World War II years here with a couple of single-engined planes. By the middle of the nineteen-sixties they had built it into an organization employing 60 people.

After the Atlantic Richfield Company announced its discovery well on the North Slope in early 1968, Mr. Magoffin's business, consisting mostly of transporting drilling equipment, supplies and personnel to the North Slope, mushroomed.

Within a year his company was employing about 350, and operated some 25 twin-engine planes, from F-27's and C-46's to turbo Beavers and Super Widgeons, as well as the six Hercs, which cost about \$750,000 each.

Earlier this year Interior's employment had dropped to some 200 people, riding the general economic slump that accompanied the delay in the pipeline construction permit.

Issuance of permits for a support road and the pipeline has been blocked by two United States district court injunctions granted in Washington to conservationists and Alaska native groups.

The Hercules became known as the North Slope "workhorse," shuttling between 20 and 24 tons of cargo a trip between Fairbanks and the drill sites on an around-the-clock basis during the frantic exploration period that preceded Alaska's big oil and gas lease sale last September.

Alaskan History

Anchorage, Alaska (Special)—An introduction to Alaska's colorful past can be enjoyed by those who visit the new Historical and Fine Arts Museum here. The modern building, a leftover from the recent Alaska Centennial program, houses many historical objects, rare artifacts and selected native arts and crafts, ranging from driftwood cooking dishes and intricate prehistoric Eskimo ivory carvings to large dogsleds and Indian canoes. Admission is free.

Helicopter Brings Supplies To Remote Arctic Colonies

By NANCY MORAN

On Aug. 21 the Fort St. Louis, a 4,000-ton cargo ship, steamed into Resolute Bay, deep in the Arctic, with a Sikorsky S-64E Skycrane lashed to her deck.

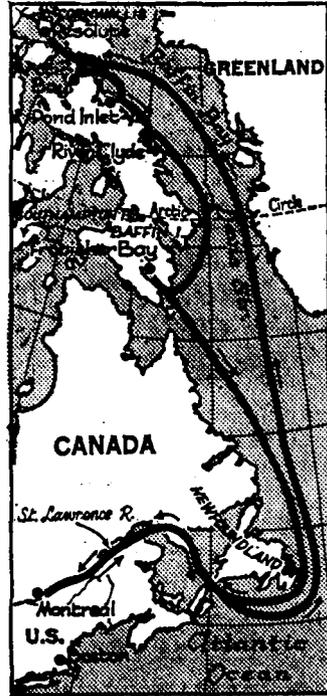
During the next two weeks, the huge helicopter unloaded 1,342 tons of supplies for Eskimos, explorers, oil drillers, missionaries and Canadian Government employes living at Resolute and four other isolated settlements. The supplies included school-buses, trucks, food, tools and a prefabricated Anglican church.

This was all part of an experiment by the Canadian Department of Transportation on the use of heavy lift helicopters for delivering cargo from ship to shore in 75 Arctic settlements.

Working throughout the long Arctic day—from 8 A.M. to 10 P.M.—the helicopter proved a far faster way of unloading supplies than the conventional method, decades old, of using lighters and trucks. Canadian Government spokesmen said, however, that a final decision on whether to use helicopters on a regular basis awaits the results of a complete cost analysis of the new unloading method.

In order to supply 75 settlements in the Northwest Territory during the three months the area's bays are free of ice it would require several helicopters, a Government spokesman said. A skycrane costs \$2.5-million.

The Department of Transportation is intensely interested in developing new



methods of supplying the area because of the current oil-exploration boom and population growth. Only 35,000 people live in the vast 1.2-million square miles of territory, but the population is growing nearly three times as fast as in Southern Canada.

A year ago, Nordair, Ltd., a Canadian domestic airline, began twice-a-week jetliner service to Resolute Bay, 100 miles east of the North Magnetic Pole, and to Frobisher Bay, which is about 1,300 miles north of Ottawa. Both settlements have gravel-surfaced runways.

However, the cost of flying in supplies is prohibitive. To air-freight a case of beer from Montreal to Frobisher, for example, costs \$12.

So most supplies are

A CREDIT OVERDUE

The editor regrets his failure to credit George Holton of New York for his excellent photo used on the cover of the June 1970 POLAR TIMES, by courtesy of Lindblad Travel, Inc.

The Adelle rookery is at Torgerson Island near the United States scientific station of Palmer.

brought into the northern settlements by ship along the route of the old Northwest Passage. This route is completely closed by ice for nine months of the year and during the summer months weather conditions are far from ideal. There is heavy rain and fog. Ice flows and tides that range up to 50 feet between the high and low prevent the building of pier or terminal facilities.

The Fort St. Louis met foul weather almost as soon as she left Montreal on Aug. 10 for the 3,000-mile trip to Resolute Bay, according to Thomas H. Marlow, a Sikorsky executive who supervised the month-long project. Heavy ice flows in the Davis Strait forced the cargo ship, which had no special ice-breaking equipment, to sail east and keep to the warmer waters off the coast of Greenland.

As soon as the ship reached Resolute, the helicopter was unstrapped and flown to the shore. But heavy fog immediately set in, and unloading operations were delayed for 48 hours.

Finally, Mr. Marlow related, the bad weather lifted and the helicopter began ferrying crates of food and clothing to the tiny settlements along the shore of the bay. Groups of Eskimos gathered to watch as the 100-foot-long helicopter flew by with boxes and crates dangling from the steel cables attached to its undercarriage. "Chop-chop, chop-chop," little Eskimo children called out, imitating the sound of the helicopter.

Sikorsky had sent along two three-man helicopter crews and about a half dozen supervisory personnel to man the project. According to Mr. Marlow, most said they were fascinated by the terrain—the huge icebergs, the sparse gray-green tundra and the tall mountains—and the wildlife—seal, bear and birds—but were bored by the lack of entertainment.

"There wasn't much to do during those long Arctic evenings but unload some more supplies or drink," Mr. Marlow, a slim, dark-haired man in his mid-30's, said. "And there wasn't even much to drink—just beer and a little bourbon. To amuse ourselves, we all grew beards."

After spending four days at Resolute, the Fort St. Louis, which had picked up an ice-breaker as an escort, sailed

south to the tiny outposts at Arctic Bay, Pond Inlet and Clyde River, all on Baffin Island. The expedition's last stop was Frobisher Bay, a settlement of 3,000 people, about half of them Eskimos.

At Frobisher Bay, the helicopter lifted the Anglican church ashore. After that, the men sailed back to Montreal and, according to Mr. Marlow, a stiff drink of Scotch.

Russian Monk Made a Saint

Kodiak, Alaska, Aug. 9 (UPI) — Herman, a humble Russian monk who never became a priest, has been made an orthodox saint called The Flower of the Northern Wilderness . . . Joyful Laborer on Spruce Island.

Special ceremonies during the weekend in this tiny northern town of 400 raised Herman to the rank of saint, the first ever in this hemisphere for the Orthodox Church.

Nine bishops and scores of priests along with deacons and seminarians were among the clergy gathered here for the historic occasion.

The canonization, the first in a century in the 850,000-member Orthodox Church, was held in the very church where Herman and seven other clergymen from czarist Russia established the first Orthodox Church in America in 1794.

American Polar Society

DR. F. ALTON WADE
President

DR. THOMAS C. PULTER
CAPT. FINN RONNE
DR. JOHN H. ROSCOE
WALTER SULLIVAN
Vice Presidents

AUGUST HOWARD
Secretary

DR. WILLIAM O. FIELD
Treasurer

Board of Governors

ROBERT B. ATWOOD
PROF. WILLIAM S. BENNINGHOFF
LOUISE A. BOYD
DR. RICHARD L. CAMERON
R. ADM. GEORGE DUFEK, U.S.N. (RET.)
HERMAN R. FRIIS
EDWARD E. GOODALE
DR. LAURENCE M. GOULD
ARNOLD M. HANSON
ROBERT J. JOHNSON
DR. WALDO K. LYON
CAPT. DAVID C. MUTT
DR. NED OSTENSO
GERALD PAGANO
CHARLES E. PASSEL
DR. MARTIN A. POMERANTZ
DR. ALAN H. SHAPLEY
CHARLES H. STOLL
R. ADM. CHARLES W. THOMAS, (RET.)
PROF. NORBERT UNTERSTEINER
DR. H. BRADFORD WASHBURN, JR.

The Polar Times

Published June and December by the

AMERICAN POLAR SOCIETY,
August Howard, Secretary,
98-20 62nd Drive (Apt. 7H),
Rego Park 74, New York.

AUGUST HOWARD, Editor

THE POLAR TIMES highly recommends "The Polar Record," published by the Scott Polar Research Institute, Cambridge, England.

The American Polar Society was founded Nov. 29, 1934, to band together all persons interested in polar exploration. Membership dues are one dollar a year, which entitles members to receive THE POLAR TIMES twice a year.

Back issues are 50 cents each.

New Adventure for Hudson's Bay Company

By JAY WALZ

The New York Times

WINNIPEG, Manitoba, July 16—Since 1670 the Hudson's Bay Company has burgeoned across Canada from a few scattered trading posts into an adventurous multimillion-dollar company that today even sells refrigerators to Eskimos.

This summer, to celebrate its anniversary, the company is taking on a brand-new adventure—after 300 years it is moving its headquarters from England to Canada. Officials will be centered here in Winnipeg, once known as Fort Garry, one of the company's biggest fur-trading posts.

Viscount Amory, a Briton who, as governor, has recently presided over the company's vast Canadian enterprises from Beaver House in Great Trinity Lane, London, has announced that he will retire soon to make way for a Canadian successor.

The transfer across the Atlantic will be "rather a wrench after 300 years," the former British Cabinet minister said on a visit to Canada, where he had served as High Commissioner, but he acknowledged that "it is nonsense to try to run a retailing business from 3,000 miles away."

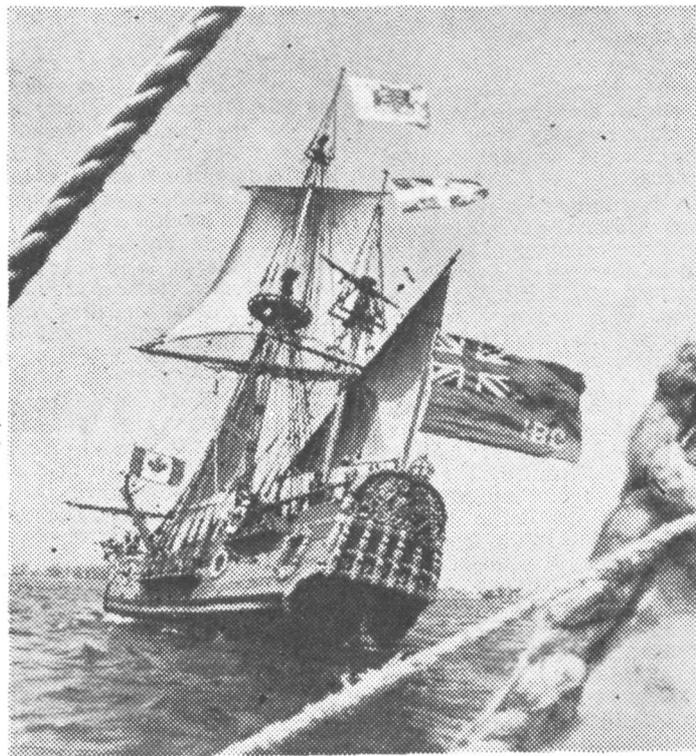
George T. Richardson, a member of a family of Winnipeg brokers, has been chosen as deputy governor and is scheduled to succeed Lord Amory in a few months in the position that most United States companies would call chairman of the board.

Queen Elizabeth II approved the transfer of the company's headquarters a few weeks ago by signing a new charter. It replaces the 1670 document by which King Charles II assigned to the Governor and Company of Adventurers of England Trading Into Hudson's Bay all trading rights in the territory whose waters drain into the bay.

That territory, Prince Rupert Land, named for the King's cousin, who was the first governor, consisted of 1.4 million square miles of what is now the Northwest Territories, the northern sections of Ontario and Quebec, all of Manitoba, most of Saskatchewan and the southern part of Alberta.

Eventually the adventurers, now calling themselves proprietors, pushed their domain to the Pacific Coast, and for a time in the 19th century there were Hudson's Bay trading posts as far south as California.

When the popularity of beaver hats, made of beaver fur or felt, declined, Hudson's Bay



Canadian Press

Reproduction of the Nonsuch, a 53-foot ketch that took original adventurers on first trans-Atlantic voyage, was commissioned by the company to celebrate tricentenary.

broadened its line of goods and services and became general storekeeper to the Canadian North and West.

A visitor in Arctic Bay, Pond Inlet or Pangnirtung finds the "Bay" to be the only store in the settlement. The 137 stores in remote communities may also serve as the post office. Eskimos and Indians go to the Bay to cash their federal welfare checks and do their shopping.

When 70 reporters and photographers covering Queen Elizabeth's Canadian tour this month were stranded overnight in Tuktoyaktuk, the Hudson's Bay store was the only source of food. Answering an emergency call, Marion Woolitsky, the manager, opened his doors at 5 A.M. to accommodate an order for seven dozen eggs (freshly flown from Edmonton), six pounds of bacon, five pounds of coffee and a basketload of canned beef, sardines, butter, jam and bread. The breakfast was prepared in the local school's home-economics kitchen.

For his resident customer, Mr. Woolitsky stocks, in addition to groceries, an inventory of notions and wool garments, Hudson's Bay blankets, muskrat traps and power tools, transistor radios and high-fidelity phonographs and washing machines—and refrigerators.

"The Eskimos are being taught to use deep freezers for storing meat between hunting seasons," he reported.

The Bay has expanded across southern Canada, too. In such cities as Winnipeg, its big establishments compete with the department-store giants. Under Canadian management, the Bay expects to push those rivals much harder.

First of all, officials want to change the company's conservative image. "We haven't been considered the swiftest company around," Donald S. McGivern, new director of retail sales, commented.

J. R. Murray, the Winnipeg-born managing director, told a reporter that the challenge the company faced was to rid people's minds of the idea that a London headquarters and antiquity "made us a little more staid than the others."

"Tradition," he observed, "doesn't sell panty hose."

While 29,500 of the company's 32,192 shareholders are British, more than 95 per cent of its business has been in Canada. Some 15,000 employees, nearly all Canadian, handled sales amounting to \$472.8-million last year. The company remains one of the world's largest fur traders (\$6.7-million last year), does a \$300,000-a-year

business in liquor, largely imports of Scotch whisky, and operates profitably in oil and gas.

At the board of governors' recent meeting in London, the 300th and the last to be held in Beaver House, the management reported 1969 profits of \$12.9-million. Assets, including 218 stores in the Canadian North and 28 medium-size and large retail establishments across southern Canada, were listed at \$272-million.

While sales rose 4.4 per cent over the preceding year, overall profits dropped 12 per cent. Fur sales were described as "much worse than anticipated" with both volume and prices disappointingly off.

Even Mr. Murray finds the Bay's traditions hard to uproot. During her visit Queen Elizabeth went 15 miles down the Red River to Lower Fort Garry to receive "two Elkes and two Black Beaver" due her as "rent" under King Charles's charter.

Tradition also requires the company to reckon years as "outfits," dating from the 1670 voyage to outfit (supply) the trading posts. Annual board meetings in Beaver House have always been "general courts."

Mr. Murray has given no sign that such terms will be dropped. However, store managers are no longer called "factors," as they were in times past, nor do accountants calculate "on the beaver" — the skin being the old unit of value. Discontinued too is the practice of conducting fur auctions "by the candle" — an inch of candle was lighted and the lot went to the last bidder before the flame flickered out.

To mark the 300th birthday, the managers commissioned a replica of the Nonsuch, the 53-foot ketch that took the "adventurers" on their first trans-Atlantic voyage. The new Nonsuch, built by a Devonshire concern to specifications found in Samuel Pepys's diary, was shipped to Montreal a few weeks ago and has been paying courtesy calls at ports along the St. Lawrence River and on the Great Lakes. The ship will eventually be moored at Winnipeg's land-locked new Museum of Man and Nature.

The venerable Bay, while respected for its age and traditions, isn't always treated reverently. Oldtimers grow hardened to jokes about its motto in Latin, "Pro pelle cutem," meaning literally "a skin for a fur" but variously interpreted by the disrespectful; company spokesmen say the modern-day equivalent would be "a fair deal."

Elizabeth, in Canadian Arctic, Is Welcomed by 1,200 Eskimos

By JAY WALZ
The New York Times

FROBISHER BAY, Northwest Territories, July 5 — Queen Elizabeth II greeted her Eskimo subjects here today at the beginning of the first royal tour of the Canadian Arctic.

Almost all the 1,200 Eskimos in Frobisher Bay, the largest Eskimo community in Canada, waved British Union Jacks and Canadian Maple Leaf flags in a welcome to the Queen as she and members of her family stepped off their plane at 11 A.M. The Air Canada jet liner held up its landing for 20 minutes while a lingering fog lifted off Frobisher Airport.

Roland Michener, the Governor General, who is the Queen's personal representative in Canada, and Prime Minister Pierre Elliott Trudeau were at the plane's side to greet the queen when she came down the ramp.

She was accompanied from London by her husband, Prince Philip, and daughter, Princess Anne. Prince Charles, the heir-apparent, came to Canada separately two days ago and joined his parents here today.

The royal entourage will make its way across the top of Canada during the next week, then move south through the Province of Manitoba. Both

the Northwest Territories and Manitoba are celebrating centennials marking their admission to the confederation of Canada.

A few minutes after her arrival, Queen Elizabeth turned the first ceremonial spade of sod at the site of a projected Anglican cathedral for the archdiocese of Frobisher.

Later, speaking informally with reporters at a noon reception, the Queen recalled that Martin Frobisher reached these rocky shores now bearing his name on a seafaring mission for Queen Elizabeth I almost 400 years ago. Frobisher Bay is situated on Baffin Island, less than 200 miles from the Arctic Circle. It is about 1,200 miles north of Ottawa.

The monarch's itinerary among the Eskimos has been arranged to emphasize her role as Queen of all Canada, and to stress at the same time the role of these northerners as Canadians.

The New York Times

YELLOWKNIFE, Northwest Territories, July 10 — Queen Elizabeth of Canada traveled 5,000 miles across the Arctic this week impressing on Canadians that their big, rich north-

land is their inheritance to develop and protect.

The trip, while following the familiar routine of a royal tour, was in fact a demonstration of Canadian sovereignty in the Arctic. In a radio message from Yellowknife, the capital of the Northwest Territories, the Queen urged Canadians, including the Eskimos and Indians she met this week, not to let their frontier regions be spoiled by outsiders who might covet their wealth.

"It is most important," the Queen declared in the broadcast Thursday, "to bear in mind that thoughtless meddling and ill-considered exploitation is just as bad as wanton destruction."

Her words seemed to many of the northerners to echo Prime Minister Pierre Elliot Trudeau's recent calls to Canadians to develop their own North. He has said that Canada must make sure that the environment is not polluted while oil, ore and other minerals are taken from the earth.

At such points as Frobisher on Baffin Island, Resolute on Cornwallis Island, Inuvik and Tuktoyaktuk on the Canadian mainland, the Queen smiled and shook hands through a series of "informal walks." She wore the colorful native garments presented her for protection against the Arctic chill.

She flew to Tuktoyaktuk, the most northern town on the mainland, to observe the mid-

night sun. When it was obscured by clouds, the villagers resorted to traditional entertainment, drum dances by folk artists ranging in age all the way up to 84.

The trip was billed as a "people tour." But there was more to it than exchanging smiles with these friendly, respectful people who have lived for many centuries by hunting and fishing. Now they are trying to adjust to a white man's society, headed by a monarch whom until this week they knew only by her pictures.

No king of queen had ever been in their midst before, and the Eskimos showed their appreciation by an outpouring of presents—parkas or hooded fur coats, mukluks or decorative fur boots, wool blankets, skin rugs and soapstone carvings.

On the occasion of the 100th anniversary of the Northwest Territories in the confederation of Canada, the Canadian Government is paying \$750,000 for the tour, partly to honor the Queen of Canada, and, partly to impress the 12,000 Eskimos and Indians that they have a monarch looking after them. But more than that, the tour is designed as a demonstration that the territory's 1.5 million square miles and the vast water surrounding it are Canada's.

On Tuesday the Queen was flown over the channel of the Northwest Passage to reach Resolute. While walking and chatting with the natives, she was also stressing again Prime Minister Trudeau's point that the passage, too, is Canadian, not a free international waterway between Canadian islands.

What makes this timely is the world publicity given the recent voyage of the United States tanker Manhattan through the passage.

Visitors here see other manifestations of a United States presence in the world's last great frontier. When, for example, the Queen and her daughter, Princess Anne, were escorted through the modern transport and communications complex at Resolute, they could see the United States flag fluttering beside the Canadian Maple Leaf banner over the weather station operated jointly by the two countries. There are six other such stations in the Northwest Territories.

As the Queen could see, too, Canada's hold on her North is spotty and tenuous. In recent months Mr. Trudeau pushed through Parliament a bill asserting Canadian authority to control pollution 100 miles out to sea from any Arctic shore. Yet Frobisher, a new Government-administered town of 1,200 Eskimos and whites, pours raw sewage into Frobisher Bay. Sewage is disposed of similarly in settlements across the Arctic.



UPI Telephoto

Northwest Territories Commissioner Stuart Hodgson helps Queen Elizabeth with parka he presented her during tour of Frobisher Bay. Others in the royal party (from left) are Prince Charles, Princess Anne and Prince Philip.

INTEREST GROWING IN EASTERN ARCTIC

Companies Negotiating With Canadian Government Over Aid for Baffin Island Sites

The New York Times

TORONTO, Dec. 25 — By demonstrating the possibilities of year-round passage through Lancaster Sound, the 1969 and 1970 Arctic voyages of the United States tanker Manhattan have quickened interest in mining on the northern end of Baffin Island, where winter temperatures 30 degrees below zero are common.

New studies of production costs from two known Baffin ore bodies 450 miles north of the Arctic Circle are under way. Next summer, a flock of companies will resume chipping at, shooting electronic waves at and drilling into likely looking terrain on Baffin's Borden Peninsula, on either side of Foxe Basin and on the mainland west of Hudson Bay.

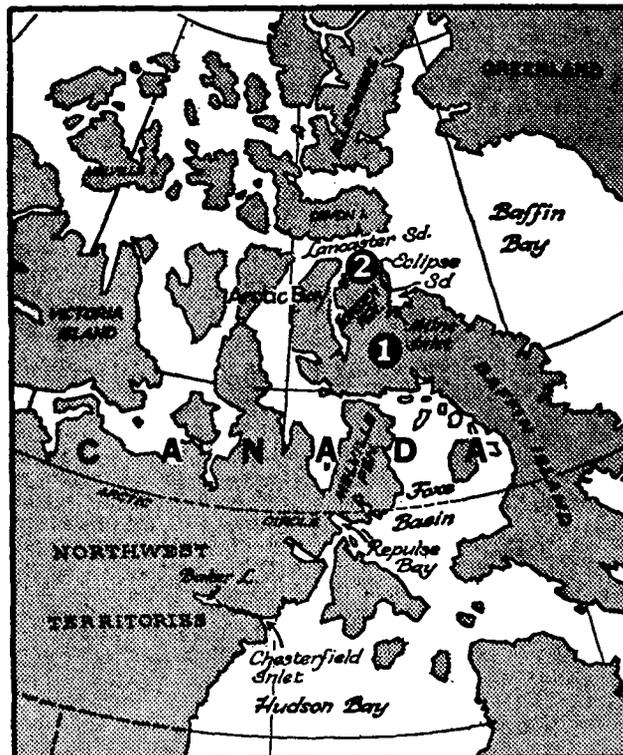
Baffinland Iron Mines, Ltd., owned by a consortium of South African and Canadian mining companies, is taking a new look at producing from its big, high-grade Mary River iron ore body 60 miles south of Milne Inlet.

The Texas Gulf Sulphur Company has applied for a license to export lead and zinc from the northern shore of Strathcona Sound, a few miles northeast of the Eskimo settlement of Arctic Bay.

Both companies say they are uncertain that they can overcome climatic and transportation difficulties and still sell at a competitive price. The difficulties are undeniably formidable. It may also be that the companies make the most of them because they are negotiating for as much Government assistance as they can get — transportation facilities, power, townsite construction and communications.

However uncertain the companies profess to be over the economics of transportation in the area, there is no mistaking that since the voyage of the Manhattan minerals men in this mining-minded country are more optimistic than they have been about prospects in the central and eastern Arctic.

Ottawa is pleased because both regions lag far behind the western Arctic and the Yukon Territory in economic development. Having oriented northern



The New York Times

Dec. 24, 1970

EXPLORATION SITES: Mining companies are taking a new look at the iron-ore properties near Milne Inlet (1) and the zinc and lead deposits near Arctic Bay (2).

Indians and Eskimos away from traditional life styles, notably living off the land and sea, the Government is now worried that there will be too few wage jobs and business opportunities.

A year ago, the Department of Indian Affairs and Northern Development forecast that six new mines in the Yukon and Northwest Territories would start producing in the nineteen-seventies.

The department did not specify the six, but the Texas Gulf Sulphur and the Baffinland properties are good bets. Baffinland's Mary River property was the first stop in August, 1966, when the Government took a group of industrialists on an aerial tour of the Arctic to demonstrate its economic potential. Not much has happened at Mary River since then.

Last spring, however, the S.S. Manhattan, a tanker equipped like none other to break her way through ice, steamed through Eclipse Sound to within seven miles of Milne Inlet, to which the mine would be linked by railway.

That showed, said Gavin W. H. Relly, that "we could ship 12 months a year with a ship designed for it, an ideal ship." Mr. Relly is president and chairman of the Anglo-American Corporation of Canada, Ltd., the South African-controlled company with a dominant 45 per cent interest in Baffinland Iron Mines.

In an interview, Mr. Relly

said such a ship would have a carrying capacity of 250,000 tons, about 100,000 more than the Manhattan, would be "heavily powered and reinforced" and might cost about \$60-million. He said he had discussed design and construction with shipbuilders.

Such mammoth bulk carriers would shuttle between Milne Inlet and a transshipment port on Newfoundland.

Mr. Relly stressed that this was only one possible transportation arrangement and that his company was still very uncertain about what the cost per ton of ore would come to.

He termed the outlook for selling the iron ore excellent, if the price were competitive. The ore grades 68 to 69 per cent iron, so high that it can be shipped directly without processing. It is especially sought by steelmakers, who use electric smelters rather than blast furnaces.

So far 139 million tons of ore have been estimated at Mary River. Mr. Relly voiced confidence that further exploration work would double that figure. The estimated breakeven rate of shipping is four million to five million tons a year.

Mr. Relly said the company's capital costs would be under \$200-million. In addition, the Government would spend tens of millions of dollars for harbor facilities, roads, an airport, a townsite, schools and public buildings. Employment might

be 400 to 500 people, whites from southern Canada and Eskimos, with the total population of the new town perhaps 2,000 to 2,500.

The Texas Gulf Sulphur venture, which has similar transportation uncertainties, would be much smaller, perhaps \$25-million and 50 to 60 jobs.

Devon Smith, the company's Toronto spokesman, said the company applied last spring for an export license but had not received it. He said he did not know the reason for this.

In Ottawa, the Department of Indian Affairs and Northern Development said the company had failed to specify what it would ship — ore or concentrates — how much and to what market.

Texas Gulf Sulphur's position is that it cannot provide such data until it undertakes additional, expensive studies. It is reluctant to do so without an export license. It may be that the United States company is anxious because of the wave of economic nationalism Canada is experiencing.

According to Mr. Smith, "The impression we have is they're not sure what terms they're going to have for development there—who they're going to allow to develop the north."

In fact, Ottawa has a broad review under way of the whole question of foreign investment in Canada.

The King Resources Company of Denver has been exploring the Borden Peninsula for lead and zinc. Further south, on the west coast of Baffin Island, the Patino Mining Corporation landed supplies by boat last summer for exploration and drilling in 1971. The company wants to know the size of a deposit of high-grade iron ore there.

Ventures like these, and like the exploration for uranium and nickel along the west bank of Hudson Bay, focus attention on ice-prevention and ice-breaking technology. For example, improvement of bubblers or other devices to keep harbors ice-free would hasten the mining of minerals in the Arctic.

Museum Finds Historic Flag

SITKA, Alaska (UPI)—The United States flag raised at Sitka upon the transfer of Alaska from Russia on Oct. 18, 1867, was found in the recesses of the Sheldon Jackson Museum.

Arctic Gets Prairie Water

REGINA, Saskatchewan (Canadian Press)—Prairie water flowing through three river systems puts 43,880,550 billion gallons into the Arctic each year, the Prairie Provinces Water Board estimates.

Technician Charged in Slaying On Ice Island in Arctic Ocean



The New York Times July 31, 1970

By RICHARD HALLORAN
The New York Times

ALEXANDRIA, Va., July 30 — A case of alleged murder on an Arctic ice island, with possibly international legal complications, unfolded here late this afternoon as a Mexican-born American citizen was charged with the crime.

Mario Jaime Escamilla of Santa Barbara, Calif., was charged with killing Bennie Lightsey of Louisville, Ky., with a rifle shot on July 16 on Fletcher's Ice Island, floating about 325 miles from the North Pole.

Mr. Escamilla, 33 years old, is a technician working for the AC Electronic Defense Research Laboratory of General Motors. Mr. Lightsey, 31, was the leader of a 20-man joint Government-industry weather and oceanographic research team. He was employed by the Environmental Sciences Services Administration of the Department of Commerce.

The legal complications arise over the question of jurisdiction. Mr. Escamilla was charged before a United States magistrate under special maritime laws that apply to ships at sea. But both the United States attorney and the suspect's attorney said that whether Mr. Escamilla could be tried in a United States court would be a key question in the case.

An experienced legal observer noted that "an iceberg has not yet been held to be a ship at sea." If a judge rules that



United Press International

Mario Escamilla under guard in Washington

the maritime law does not apply to crimes committed on Arctic ice floes, no one here could say what court would have jurisdiction.

The complaint filed today said that the ice island was "floating on the high seas within the special maritime and territorial jurisdiction of the United States of America and out of the jurisdiction of a particular state."

The case was brought into the United States District Court for the Eastern District of Virginia because Dulles International Airport, which is in the court district, was the first place that Mr. Escamilla touched down when he was returned to the United States earlier this afternoon. United States Attorney Brian P. Gettings will prosecute for the Government.

According to the complaint filed by the four-man Federal team that brought back Mr. Escamilla and the body of Mr. Lightsey, the accused had admitted to other members of the research group "that he was responsible and had shot Bennie Lightsey."

A member of the group on the island, Charles Parodi, was said to have been in one of the island's prefabricated huts with Mr. Escamilla and Mr. Lightsey immediately before the shooting. Mr. Parodi was said to

have seen Mr. Escamilla pointing a rifle at Mr. Lightsey.

Mr. Parodi left the hut and seconds later heard a shot. Another member of the group, Richard Scattolini, also heard the shot and he ran into the hut to find Mr. Lightsey on the floor wounded and the rifle leaning against the wall. When Mr. Lightsey died was not specified.

No motive for the slaying was given.

The alleged murder first came to light in a radio report to Point Barrows shortly after Mr. Lightsey's death. But details were sparse. The United States attorney's office here suggested that radio reports of the act be kept to a minimum to protect the rights of the defendant and not to upset the prosecution's case.

Earlier this week, a team consisting of Richard McKenna of the naval investigative service, Vernon L. Kaliher of Navy Intelligence, Frank Love of Coast Guard Intelligence, and Justin Williams, an Assistant United States Attorney here, flew in an Air Force plane to a remote Air Force base in Greenland.

There they transferred to a helicopter, which flew them to the 28-square-mile Fletcher's Ice Island. A conventional aircraft could not land there because the island is slushy under a 24-hour summer sun.

The helicopter was accompanied by an Air Force reconnaissance plane that scouted ahead for signs of treacherous weather and by a flying tanker that twice refueled the helicopter in flight. It is believed that this was the first such aerial refueling over the Arctic Ocean.

The investigating team stayed on the ice island for about 36 hours to interview members of the research group. One of the agents, Richard McKenna, said that the scene was "very shocking" but declined to give details.

The investigative team, along with Mr. Escamilla and Mr. Lightsey's body, returned to the United States over approximately the same route. Precise details were not made public because they may have a bearing on the jurisdictional issue.

In a preliminary hearing this afternoon, Mr. Escamilla stood before United States Magistrate Stanley King, an official of the district court, blinking nervously and shifting his weight from foot to foot. The accused, who has mutton-chop sideburns and a goatee, was wearing a green striped sport shirt, gray trousers, and black rubber Arctic boots. He was flanked by his attorneys, Leroy E. Batchelor and William E.

McDaniels, who were retained by his employer to defend him.

After being advised of the charges, his rights, and the procedure that would be followed, Mr. Escamilla asked in a barely audible voice whether the witnesses from Fletcher's Island could get here within 10 days to testify at a pretrial hearing. The magistrate said he did not know, but that the defendant's attorneys could ask for a continuance if that was necessary.

The pretrial examination was set for Wednesday, Aug. 5. Mr. Escamilla's attorney said that he would apply for his client's release on bail tomorrow.

Larger Than Manhattan

The ice island known as T-3, or Fletcher's Ice Island, has been the longest-occupied and scientifically the most fruitful of American drifting stations in the Arctic. It is roughly seven miles long and four miles wide, making it slightly larger than Manhattan Island.

Unlike ice floes, which may crack, splitting a camp in two, the ice islands are relatively durable fragments of ice formed on land or as an apron attached to land. Most are thought to originate on the north coast of Ellesmere Island.

In 1947, B-29 aircraft of the Army Air Force, making routine patrol flights, observed ice islands that were assigned radar target designations: T-1, T-2 and T-3. By 1952 T-3 had drifted to within 120 miles of the North Pole and was occupied as a scientific station by Col. Joseph O. Fletcher.

Adrift in Vortex

It has been occupied, intermittently, ever since. For a time the island was aground but it is again adrift in the great circumpolar vortex that, it is hoped, will bring it back past the Canadian Archipelago. Current observations, by a team of some 19 specialists, cover a wide range.

According to Dr. Kenneth Hunkins of Columbia University's Lamont-Doherty Geological Observatory, which is conducting some of the observations, they include, in addition to weather, the recording of ocean depths, using the Transit satellite for precise position-determination. Sea-floor samples are being taken, as well as bottom photographs, gravity data and magnetic measurements.

The United States Geological Survey is taking the core samples from the bottom and is measuring heat flow from the earth's interior. The University of Washington is collecting samples of marine life as the ice island is pushed by winds and currents.

PIPELINE CONCERN FORMED IN ALASKA

Oil Companies Unite to Build and Operate System

HOUSTON, Aug. 28 (AP)—The formation of a new corporation to build and operate the \$900-million, 800-mile Trans-Alaska Pipeline System was announced today.

The new company, the Alyeska Pipeline Service Company, will be headed by Edward L. Patton, former manager of a new oil refinery complex that the Humble Oil and Refining Company recently opened near San Francisco Bay.

Government clearance at the state and Federal level has delayed the start of construction of the pipeline, which is designed to move oil from Alaska's North Slope on Prudhoe Bay, where oil reserves of more than 10 billion barrels were discovered in 1968, to Valdez, Alaska.

A lease sale in the area brought the State of Alaska more than \$900-million on bonus payments early this year. Owners of the pipeline system will maintain their undivided interests in the line that will be built and operated by Alyeska.

In addition to the Humble Pipe Line Company, the companies are the Atlantic Pipe Line Company, the BP Pipe Line Corporation, the Mobile Pipe Line Company, the Amerada Hess Corporation, Union Oil of California, the Phillips Petroleum Company and the Home Pipe Line Company.

The announcement of the formation of the new company was made simultaneously here, where the pipeline system has its headquarters, and in Anchorage, where the line has a division office.

"We believe Alyeska will provide an efficient and effective management organization for development and implementation of the pipeline project," Mr. Patton said. "It will also provide a single contact point for various governmental representatives and agencies."

Conservation agencies have objected that extending the line across Alaska to Valdez, a seaport on the state's south coast, could create major ecology problems and endanger wildlife.

The Trans-Alaska Pipeline System would permit Prudhoe Bay oil to be moved to the West Coast.

Man Is Indicted in Slaying On Ice Island in the Arctic

The New York Times

WASHINGTON, Sept. 14—A Federal grand jury indicted Marie Jaime Escamilla today for the second-degree murder of Bennie Lightsey on a remote ice island in the Arctic Ocean last July.

The 23-man grand jury, meeting in Norfolk, Va., returned an indictment charging Mr. Escamilla with having killed Mr. Lightsey without premeditation but with malice aforethought.

Mr. Escamilla, who is presently free on bail at his home in Santa Barbara, Calif., was alleged to have shot Mr. Lightsey with a rifle in a quarrel over a jug of wine during a party on Fletcher's Ice Island.

Both the accused and the deceased were members of a joint Government-industry research team studying oceanography and meteorology in the Arctic.

The case has aroused considerable interest in legal circles because there is no precedent setting jurisdiction over the alleged crime. Escamilla was charged under a maritime law that pertains to ships at sea.

Tundra Seeds Are Developed

The Alaskan oil rush has fostered a potentially important technological spin-off in the fields of agriculture and ecology.

Atlantic Richfield Co. and Humble Oil & Refining Co., two of the most active concerns working the oil-rich North Slope, have developed seeds which can grow new grasses in the hard, bitter-cold tundra areas that will be disturbed by petroleum exploration.

Through research spearheaded by Atlantic's Philadelphia-based ARCO Chemical Co. division, four seeds were established that survived the frigid weather and germinated. The seeds now are commercially available.

"After more than 15 months of intensive investigation and observation we believe we have the seeds, in combination with fertilizers, which will revegetate disturbed tundra areas in the Arctic plains of the North Slope," said Dr. Paul A. McKim, vice president of Atlantic and ARCO.

Engineers Race to Finish Alaska Rail Link Survey

By EDWARD C. BURKS

The New York Times

Engineers are racing the onset of the Arctic winter to complete a preliminary survey on the feasibility of constructing a railroad and highway link to Alaska's far north.

They hope to report by October 15 on a possible corridor through the Brooks Range to the North Slope oil producing areas near the Arctic Ocean.

The work is part of a \$3-million engineering survey authorized by the Department of Transportation and expected to continue into 1972.

The Department is studying the possibility of extending the Government-owned Alaska Railroad from Nenana near Fairbanks in Central Alaska across the Yukon River and northward through the Brooks Range to the Umiat region in the oil areas.

In addition to the 510-mile main corridor, a 150-mile spur would run westward from Alutna on the Arctic Circle to Kobuk in an area of copper and other mineral deposits.

William Fravel, assistant general manager of the Alaska Railroad, reported yesterday that engineers and "soil people" were surveying corridors five miles wide designed to accommodate both a railroad and highway.

"They are now on the western corridor to Kobuk," he said in a telephone interview, "and are accelerating their studies to make a report on a pass through the Brooks Range."

According to Mr. Fravel, "the survey has progressed very well. By October 15 we should have a recommended corridor from Nenana to Alutna, from Alutna westward to Kobuk, and a preliminary report on a feasible corridor from Alutna north through a pass in the Brooks Range, either Anaktuyuk Pass [about 1,800 feet] or Dietrich Pass [about 2,300 feet and about 30 miles east of Anaktuyuk]."

He said that the consulting engineers and soil experts from Anchorage and Seattle were determining the best route. The actual economic feasibility of building a highway and railroad will be examined in later stages of the survey, he added.

Difficulties have included bad weather which delayed necessary aerial photography and lack of precise information on the location of the richest mineral deposits.

"We hope to hit in the mid-



The New York Times Sept. 21, 1970

Arctic links under survey for Alaskan roads, rails.

die of the whole shebang with our corridor," Mr. Fravel said, adding that short-branch rail lines could be built from the main corridor line in the future if necessary.

"We are well pleased at the way the work is going," he concluded. "The people are a little ahead of schedule."

The Alaska Railroad, connecting the Fairbanks area with all-year ports on the south coast, now consists of 544 miles, including branches. It makes a small profit. In January a proposal to sell the road was included in the Federal budget, but nothing has materialized.

A few months ago the railroad's general manager, J. E. Manley, said that the Alaska Railroad, whether public or private, would eventually be extended above the Arctic Circle both to the North Slope and to mineral areas in northwest Alaska on the south slopes of the Brooks Range.

In Europe there are comparable rail lines above the Arctic Circle in Norway, Sweden, Finland and Russia.

Strong Quake Hits Aleutians

WASHINGTON, July 17 (AP)—A strong earthquake hit the Andreanos group of the Aleutian Islands tonight, the National Earthquake Information Center reported. A spokesman said the center of the quake, measuring 6.3 on the Richter scale, was 90 miles off the island of Adak, where there is an American naval base.

CAN THE POLAR BEAR SURVIVE ?

By Christian Vibe, Ph.D.

J. L. NEWS
Published by
J. Lauritzen Lines
Copenhagen

Interest in the polar bear, both as a trophy and as an object of research, has greatly increased during the past five years. The big-game hunts organized in the tropics caused wealthy sportsmen to look for fresh prey and new hunting grounds, and they cast their eyes on the one-time inaccessible polar bears of the Arctic wastes, now within range of aeroplanes and helicopters. This new type of big-game hunt across the icefields of Alaska attracted many Americans and cost the lives of nearly 300 polar bears a year during the past decade. In Norway, too, hunting from sealers is being organized by the tourist agencies in the drift ice near Spitzbergen. In Canada and Greenland this type of hunt has yet to be organized, but heavy pressure is being put on the authorities to let it in. At present the Soviet Union is the only country where the polar bear is totally protected, except for the capture of cubs for zoological gardens.

It was the use of aircraft by the Americans in hunting the polar bear north of the Bering Strait that first attracted attention. If it were to continue the polar bear, vulnerable, defenceless and easily killed, would soon become little more than a memory. Canadian and American scientists met in Ottawa in 1964 to discuss the situation. At the meeting the need of a conference attended by representatives of all the countries over whose territory the polar bear roamed, i.e. Canada, Denmark, Norway, USA and the Soviet Union, was recognized. A meeting was accordingly held in Fairbanks, Alaska, in September 1965, the author of this article attending as Danish delegate.

Each country reported on the situation as it affected the polar bear in its area. The annual bag was reckoned to be: Canada 600, Greenland 100, Norway 325, Alaska 300 and the Soviet Union 15, (these last being only cubs), giving an annual total of 1340 polar bears. Could the polar bear population stand up to slaughter on this scale? The total population was variously estimated by the Russians at about 8,000, by the Canadians at over 10,000, and by the Americans at over 17,000. But all the figures were guesswork. There were

no concrete facts to go on, and how were facts to be obtained? The discussions at Fairbanks brought home to all those present how little we know about the polar bear and its habits, wanderings, reproductive capacity and winter and summer habitats. Was there one great single stock common to the entire Arctic? Or were there several clearly defined stocks? Was the polar bear's preservation a matter of international concern or did each country have control of its own stock?

Many such questions arose, and the answers called for research. But in what manner was the research to be carried out? The answer lay in marking as many bears as possible in all parts of Arctic, in locating the winter quarters of mother bears and cubs, in blood testing and weighing and measuring to investigate breeds, in analysing re-



A polar bear mother and cub are captured shortly before hibernating.

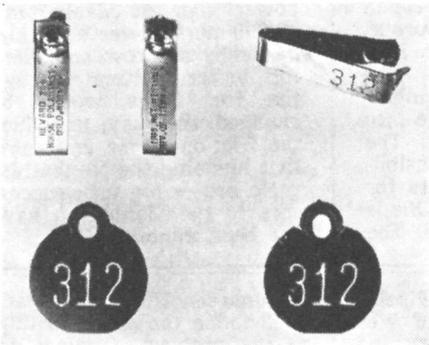
productive organs, teeth and claws to determine age, in examining tissues and bones for the effect of DDT and radio activity, and so on.

The Americans had already carried out important experiments on captured animals and in marking grizzly bears. Further work was soon in progress in Alaska, Norway (Spitzbergen) and Canada. Soon there were reports of 100 polar bears having been caught and marked. There were many surprises. Polar bears appeared to be much more localized than had been thought. Most recaptures



Three "sleeping" polar bears. The cage on the centre hatch is used during the process of wakening.

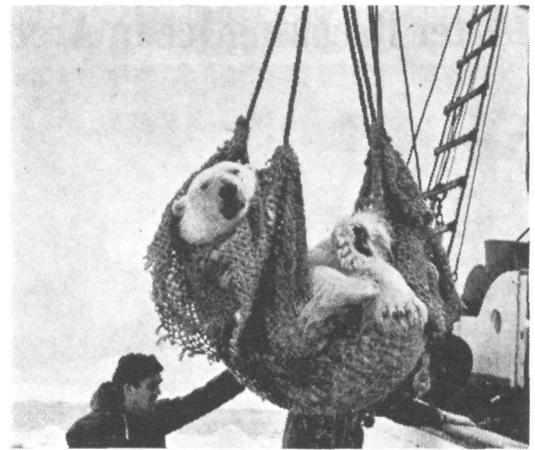
were made comparatively near the area of marking. In approximately 1½ years only one bear had drifted on the ice from Spitzbergen to Nanortalik in southern Greenland. Some years will have to



The marks borne by the polar bear marked at Spitzbergen which appeared 1½ years later at Nanortalik in South West Greenland.

pass, however, before a clear picture can emerge, for the drift ice has a rhythm of its own: slow in some years, rapid in others, and emanating from different regions of the Arctic.

Fruitful discussions were initiated between polar bear specialists. Some specialists insist on the existence of geographical breeds and local stocks, others (including the author) believe that the habitats are temporary and solely determined by local ecology, i.e. the melting of the ice influences sea production and thus the seal and polar bear habitats. The fluctuations in the volume of cod off West Greenland are well known. There are similar variations in the number of seal in the regions it frequents, and the same applies to the polar bear. The true causes must be sought in the regular small variations in the tides, which have an enormous effect in the Arctic Sea. Sun spot activity also affects the picture, although to what extent is still far from clear.



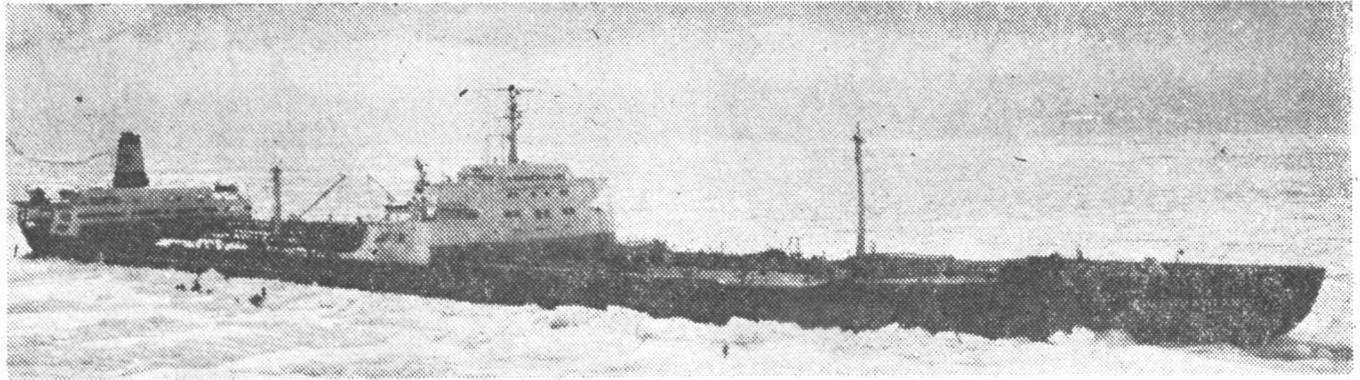
The "sleeping" polar bear is hoisted on board for examination and marking.

The next polar bear meeting was held at the International Union for the Conservation of Nature at Morges, Switzerland, in February 1968. Unfortunately the author was redirected to Thule the day before the meeting as a result of the nuclear bomber crash there. But reports from the meeting told of increasing activity on the polar bear front. A further meeting was held in the same place in February 1970. Reports from Alaska, Canada and Norway described the extensive investigations made since the Fairbanks meeting in 1965, the efforts made by Norway under Thor Larsen being particularly impressive.

There is a pressing need for Denmark to institute marking experiments in Greenland. Provisional investigations made by the author at Thule and Angmagssalik and by Ivars Silis in North East Greenland clearly indicate where and how such efforts should be made. Last spring, with the support of the J. Lauritzen Foundation, Silis also took part in Canadian bear capturing and marking in Hudson Bay in order to gain practical experience of the technique. If the considerable sums required for realization of the plans can be conjured up it is intended to start operations in the spring of 1971 in North East Greenland with a small reconnaissance aircraft and helicopter. The enterprise would be a joint Danish-Norwegian effort, and Thor Larsen, who is greatly interested in discovering whether there is any extensive contact between the bears of Spitzbergen and North East Greenland, would join us.

As regards Greenland the chief question is whether the bears that simply drift on the ice down to the region of Cape Farewell are lost or have a chance of returning north again. Many other questions also await investigation.

After Breaking Ice in Arctic, the Manhattan Returns to Tanker Service



The Manhattan, pioneer of Northwest Passage to Arctic, has been chartered to carry Persian Gulf oil to Western Europe

The world's biggest ice-breaker, the key performer in the pioneering expedition last summer through the Arctic waters of the Northwest Passage, is returning to its relatively humdrum career as a plodding supertanker.

The next voyage for the 115,000-deadweight-ton Manhattan, according to Seatrain Lines, owner of the biggest vessel in the United States merchant marine, will be to the Persian Gulf, where ice ridges are scarcer than sea serpents.

Joseph Kahn, chairman of

Seatrain, announced July 30 that the original two-year charter to Humble Oil and Refining Company for its ice-breaking experiment had been ended six months ahead of schedule.

Terms of the cash settlement were not disclosed, but they freed Humble from the obligation to remove the long sloping bow of heavy steel that the oil company had added for riding up over the ice and breaking it.

The Manhattan's ice-breaking capability, which includes other special equipment, will thus be preserved while she

demonstrates her continued usefulness as a conventional tanker, Mr. Kahn said. He called the vessel "potentially a major future asset to the United States merchant marine."

She has been chartered for eight months to carry Persian Gulf oil to Western Europe, capitalizing on current high rates for such charters.

Humble sent the Manhattan on a second voyage into Arctic ice this spring. The first was to test the feasibility of a short sea route for bringing Alaska's North Slope oil to East Coast ports. The

second was to get further data on its ice-breaking capability under different conditions, with a view to designing supertankers built from the keel up for this service.

Designers say such tankers would have to have more power than the Manhattan's 42,000 horsepower and thinner hulls at prow and stern for better cutting through the ice. Sides would be changed, they say, to reduce the friction of ice and snow that hindered the Manhattan.

No orders for such successors to the Manhattan have yet been announced.

Study Suspended on Use Of North Slope Tankers

By WILLIAM D. SMITH

The New York Times

The Humble Oil and Refining Company announced Oct. 21 that it was suspending its studies of icebreaking tankers to concentrate efforts on pipeline methods to bring oil from Alaska's North Slope to markets in the "lower 48" states.

The announcement came after the affiliate of the Standard Oil Company (New Jersey) had spent \$50-million to send the supertanker Manhattan on two expeditions into Arctic waters, including the first transit of the historic Northwest Passage by a commercial ship.

Humble said that "the use of icebreaking tankers to transport crude oil from Alaska's North Slope to United States markets is commercially feasible but the pipeline transportation appears to have an economic edge at present."

The company said that its Arctic marine studies indicated that icebreaking tankers could move North Slope oil through both the Northwest Passage to the East Coast and through the

Bering Strait to the Western United States.

This was the first mention by Humble of any consideration of moving oil through the Bering Strait to the West Coast. Humble is part of the Trans Alaska Pipeline Group that has proposed to move some of the vast oil production expected from the North Slope by pipeline 800 miles from Prudhoe Bay to the warm water port of Valdez in the south. The \$2-billion pipeline has been held up for more than a year by the Federal Government, court injunctions and environmental considerations.

The mention of the Bering Strait and the statement by Humble that "Arctic tanker development work could be resumed on short notice if economic factors change or other circumstances warrant," was seen by some analysts as a warning that the industry could not wait forever for permission to start work on the pipeline.

The Trans Alaskan Pipeline would only take care of West Coast oil demand. Another pipeline would be needed to carry the Alaskan oil to Middle Western and Eastern markets.

Canada is looking for and expects to find big oil deposits among the Arctic Islands that create the deadly maze that has made the Northwest Passage so impenetrable through the centuries. These islands are far easier to reach by ship than Alaska. The trip to Alaska involves a 4,500-mile ice-choked journey across the top of the North American continent.

The settlement of Resolute on Cornwallis Island in Canada's Northwest Territories is a natural gathering point for the petroleum if any is found in the "high Arctic." The Manhattan, although it was only a test vehicle, was found to be capable of reaching Resolute during most months of the year. Specially designed ships, it is thought, would have little trouble.

Loading the oil in the eastern Arctic would present no great problem as there are deep-water areas near the shore.

The difficulty and cost in constructing a loading facility in the shallow waters off Prudhoe was one of the main

reasons for Humble's decision to abandon the marine solution to the problem. Original estimates for building the port were about \$100-million. These soon grew to \$200-million and then considerably higher.

The same was true of the type and cost of ship needed to make a year-round run to the North Slope. Original estimates called for a \$40-million vessel of about 250,000 displacement tons and 60,000 shaft horsepower.

Final estimates called for a ship of about 300,000 tons, driven by engines of approximately 100,000 horsepower and built at a cost of between \$60-million and \$100-million. It is unlikely that the Canadian ships will need quite this much power or size and thus the dreams of John Cabot and Martin Frobisher may become a reality before this decade is out.

License Plates Too Popular

YELLOWKNIFE, Northwest Territories (AP)—A special issue of automobile license plates issued by the Northwest Territories Government to commemorate 1970 as Centennial Year has created a problem. Collectors like the unusual plates so much that they are stealing them from parked automobiles.

SMITH, William D. *Northwest Passage*. photogs. by the author. 248p. contemporary illus. American Heritage. 1970. \$6.95. LC 79-111652. EXPLORATION

The great story, splendidly told, of the S.S. *Manhattan's* navigation of the Northwest Passage in 1969. Smaller ships had made the passage, but this epic U.S.-Canadian undertaking was for the original 400-year-old commercial purpose, and included the special design and building of the ship for oil transport from the North Slope of Alaska, scientific tests of ice and ice-breaking, and some exploration of another possible passage. The author, a *New York Times* reporter, was official chronicler and made the voyage from beginning to end. He has done a beautiful job of weaving together the many threads of a complex venture. The chapter on the building of the huge tanker for her specific purposes is a thriller in itself. Also fully covered are the scientific objectives and their achievement, the moods and relationships of officers and crew, the moments of danger, the behavior of the *Manhattan* and her Canadian icebreaker escorts, and the Arctic landscape with its powerful pull on human minds. For all libraries, highly recommended—Phyllis Pope, Pontiac Public Library, Mich.

Polar Operations

Captain Edwin A. MacDonald, U. S. Navy (Ret.). Annapolis, Md.: U. S. Naval Institute, 1969. 224 pp. Illus. \$11.00.

Reviewed by Sir Vivian E. Fuchs

(*Sir Vivian E. Fuchs is an internationally-known geologist and explorer. Since 1929, he has completed various expeditions throughout the world, including the Antarctic. He has been awarded medals from many countries for his expeditions and geological work. He was co-author of the book The Crossing of Antarctica, and has written several geological and geographical papers. He is presently Director of the British Antarctic Survey.*)

The use of ships in the polar regions implies the need to navigate in ice. Whether the vessels be large or small, a high degree of skill and experience is required to penetrate safely the varied conditions which are encountered. Many ships have been lost, damaged, or beset for long periods. These experiences have built up a fund of knowledge, but until now, no general assessment of the problems has been published.

In *Polar Operations*, we have the first book which deals comprehensively with the subject. It will be of value and interest to all who sail in the polar seas, whether they be observers or experienced ice pilots in command of vessels. The author has delved deeply into the history of the ice pilotage, and, using his own

The Discovery of Antarctica

IT REMAINED for a twenty-one-year-old Connecticut boy to discover the [Antarctic] continent nearly a half-century after Cook's second voyage. Despite his youth, the boy was captain of a ship that sailed below the circle in the late south polar spring of 1820. His name was Nathaniel Brown Palmer and in his honor the northern peninsula of Antarctica is designated on most American maps as Palmer Land.

This boy's claim to one of the major geographical discoveries of all time was no accident. Palmer was an explorer with the assigned job of finding new lands. He was master of the forty-five-ton sloop *Hero*—forty-seven feet long with a sixteen-foot beam—only a little larger than an ordinary cabin cruiser of the present. He was necessarily a skilled seaman and an expert navigator . . . perhaps it would be better to say that he was an instinctive navigator, for he steered his little craft, manned by five grizzled New England sailors, through driving snow in the world's most perilous waters where no stars shone. . . .

This was sometime between Nov. 15 and 21, 1820, according to the calculations of Professor William H. Hobbs of the University of Michigan. Palmer had found his new land, from his own sun observations at about latitude 63.45 south and longitude 60 west.

long and wide experience, has compiled a fascinating and readable volume, which is full of factual information and valuable advice.

The scene is set by a chapter on the environment, which describes the stages of sea ice formation and states the nature and behavior of sea ice in both the Arctic and Antarctic. This is followed by a discussion of icebreaker development and a chapter on the all-important handling of vessels in ice, including the use of helicopters for selecting a route.

A particularly valuable section is that concerning the use of icebreakers to free a beset ship, or to accompany a convoy of vessels which are not themselves powerful or strong enough to penetrate the ice. These are especially difficult operations demanding skills which are unlikely to be known by most masters. The author's description will do much to prepare inexperienced commanders for this kind of situation.

Under "Voyage Procedures," the reader is given the special preparations necessary for protecting unstrengthened ships, methods of mooring to ice, the removal of ice from the superstructure, and the general handling of such ships when entering or maneuvering in ice.

An important chapter is that on polar navigation when special problems arise.

A distinguished contemporary witness of unquestionable veracity, Admiral Fabian von Bellingshausen of the Imperial Russian Navy, substantiated Palmer's claim. . . .

Palmer wrote in his diary:

I gave him the latitude and longitude of my lowest point. He rose much agitated, begging I would reproduce my log book and chart, with which request I complied and a boat was sent for it. When they were laid on the table, he examined them carefully without comment, then rose from his seat saying:

"What do I see and what do I hear from a boy in his teens—that he is commander of a tiny boat the size of the launch of my frigate, has pushed his way to the pole through storm and ice, and reached the point I, in command of one of the best-appointed fleets at the disposal of my august master, have for three long, weary, anxious years sought day and night for."

With his hand on my head, he added:

"What shall I say to my master? What will he think of me? Be that as it may, my grief is your joy. Wear your laurels with my sincere prayers for your welfare. I name the land you have discovered in honor of yourself, noble boy, Palmer's Land."—From "The White Continent," by THOMAS R. HENRY. Copyright, 1950, by Thomas R. Henry. William Sloane Associates, 1951.

There are a few good hydrographic charts available, and the coastlines may be inaccurately mapped and normal dead reckoning cannot be used when navigating at different speeds and directions through ice. These problems and various solutions are discussed, as are the special use of radar, ice atlases, and other sources of information.

The last three chapters are devoted to ice seamanship, wintering, and safety. Although these are not so much concerned with the operation of ships, they provide an excellent guide to those engaged in setting up a station. The responsibilities of ships' captains, pilots, and station commanders are pointed out, and much valuable advice is given.

In the appendices, there is technical information dealing with such matters as the movement of traffic over sea ice, reporting of sea ice conditions, particulars of the world's icebreakers, rules for ships' ice classes, and various tables. There is also a useful glossary, but it should be said that many of the terms given appear to originate in the United States and are not in general use.

Altogether, this is an excellent book which is lavishly illustrated. It should certainly be carried by every ship which is likely to operate in ice-filled waters.

ANTARCTICA DISCOVERED BY A CONNECTICUT YANKEE, CAPTAIN NATHANIEL BROWN PALMER*

Lawrence Martin
Library of Congress

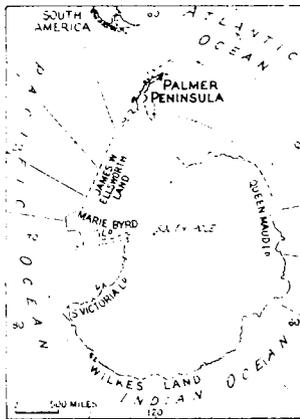


FIG. 1—Antarctica, showing position of Palmer Peninsula. To give an idea of size the United States has been superimposed.

"Got underweigh", wrote Captain Nathaniel Brown Palmer, master of the sloop *Hero*, on the ship's day of November 16, 1820 (he was at Deception Island, in the South Shetland archipelago, south of Cape Horn); "at 10", he continued, "we were clear from the Harbor [Port Williams, often miscalled Yankee Harbor] stood over for the Land [Antarctica] Course S by E 1/2 E [magnetic] Ends with fresh Breezes from SW and Pleasant" (Fig. 6).

Thus Captain Nat recorded the first sighting of Antarctica. We do not know at present whether the land was seen initially from the masthead of the sloop or from some point on the walls of the breached and submerged volcanic crater that constitutes Deception Island, where the master of the *Hero* had climbed the previous day to gather eggs. On November 15 he had discovered this snug Antarctic haven which is like Crater Lake, Oregon, in nearly all respects except that the water is salt and tidal. Palmer had left Stonington, Connecticut, on July 31 and had reached Presidents Harbor, or New Plymouth, at the western end of Friesland, or Livingston Island, in the South Shetlands, on November 12.

The Cruise of Discovery in November, 1820

On that date he wrote in his logbook that there were "no seal up"; on the 14th he said: "Capt. Dunbar with Mr. Pendleton dined with us" (Fig. 6). In these two entries are disclosed the motives of the discovery cruise. Captain Benjamin Pendleton, master of the brig *Frederick* and commodore of the fleet of five Stonington sealers in which he and Edmund Fanning were financially interested, evidently came aboard the *Hero* to plan what was to be done next. With him came Captain Thomas Dunbar, master of the schooner *Free Gift*. The two other vessels in the fleet were the brig *Hersilia* and the schooner *Express*.

On November 12, as stated above, the logbook recorded that there were no seal on the beaches at Presidents Harbor and Hersilia Cove. This was the locality from which the brig *Hersilia* had taken 8868 fur-seal skins during the previous season, 1819-1820, when Palmer had been her second mate, leaving an estimated 50,000 living seals on the adjacent beaches. The crews of the five vessels, 78 officers and seamen in all, had finished "getting clear for work" and were idle. The financial success of the Stonington investment in this sealing cruise was at stake. It is obvious that Pendleton acted decisively and ordered Palmer to take the *Hero* and search for new seal rookeries. The sloop was built for just such investigation. She

was 47 feet 3 inches long, 16 feet 10 inches in beam, and 6 feet 9 inches deep, so that she drew little water and was an ideal shallow or scouting vessel, especially as she had a crew of only five men.

This situation has been inaccurately described in previous accounts by Fanning, by Balch, and by Spears,¹ who thought Pendleton and the fleet were at Deception Island when Antarctica was discovered.

The land Palmer saw from Deception Island may have been either the Antarctic mainland or Trinity Island (Fig. 3). The former is 50 nautical miles from Deception Island, the latter 10 miles less. It is more natural to assume that he saw the mainland rather than merely Trinity Island, since the mainland is higher and the day was clear.

Palmer's niece, Mrs. Richard Fanning Loper of Stonington, both told and wrote E. S. Balch "that her uncle was an unusually keen sighted man" and that she had "often heard him tell how he had first sighted land to the south of anything then known, of the excitement he was thrown into, and of the desire it aroused in him to go to explore it."²

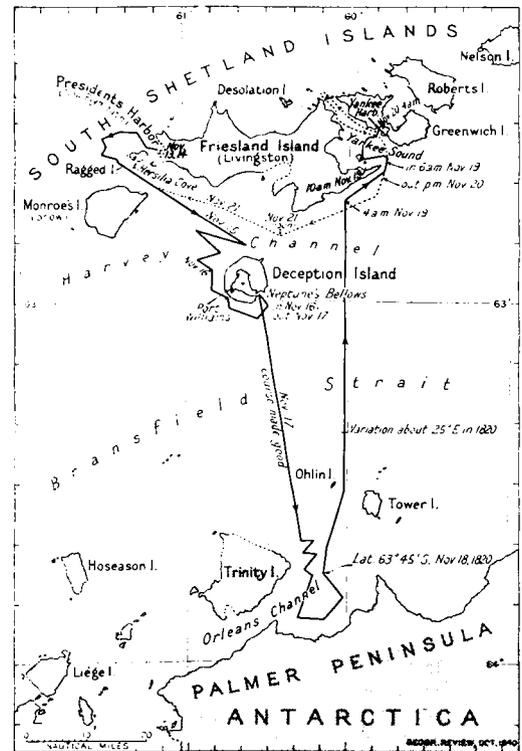


FIG. 2—Palmer's Antarctic discovery cruise in November 1820. See also inset in Figure 8.

PALMER'S FIRST VISIT TO THE NEWLY DISCOVERED MAINLAND OF ANTARCTICA

The hour when Palmer left Neptune's Bellows at Deception Island for the south was 10 a. m. on the ship's day of November 16. As a ship's day of that period began at noon, it was 10 o'clock in

Part 1, 1939, together with reviews thereof; (e) newspaper articles in 1820-1821; and (f) the books and articles cited below. The writer has presented papers before the American Philosophical Society (two), the National Academy of Sciences, the International Geographical Congress at Amsterdam (by title), and the Eighth American Scientific Congress; for abstracts see respectively "The Log of Palmer's Discovery of Antarctica," *Science*, Vol. 87 (N.S.), 1938, pp. 165-166; *Congressional Record*, Vol. 83, 1938, pp. 3279 and 3280; "Palmer's Instrumental Observations in Connection with the Discovery of Antarctica," *Science*, Vol. 87 (N.S.), 1938, pp. 465-466; "An American Discovered Antarctica," *Comptes Rendus Congr. Internat. de Géogr.*, Amsterdam, 1938, Vol. 2, Sect. 4, Leiden, 1938, pp. 215-218; and "Early Explorations and Investigations in Southern South America and Adjacent Antarctic Waters by Mariners and Scientists from the United States of America," *Congressional Record*, Vol. 86, 1940, pp. 10,293-10,294. A few dates and one or two assertions in these abstracts are now modified in the light of newly discovered contemporary evidence.

This paper summarizes the data and conclusions to be presented in a book dealing with Palmer's explorations between 1810 and 1831 which is to be published within a few months.

¹ Edmund Fanning: *Voyages round the World*, New York, 1833, pp. 434-435; *ibid.*, London, 1834, pp. 434-435; E. S. Balch: *Antarctica*, Philadelphia, 1902, pp. 85-86; J. R. Spears: *Captain Nathaniel Brown Palmer, An Old-Time Sailor of the Sea*, New York, 1922, pp. 64-66 and 69.

*This paper is based mainly on manuscript materials in the Library of Congress, Washington, D. C., largely received from Captain N. B. Palmer's great-nephew and great nieces, Mr. A. P. Loper and his sisters of Stonington, Conn. Among these materials are the following: (a) logbooks of the sloop *Hero* for 1820-1821 and 1821-1822, the schooner *Penguin* for 1822-1831, and the ship *Charles Adams* for 1831-1832; (b) contemporary documents written by Captain N. B. Palmer and his brother Captain A. S. Palmer, together with the American Geographical Society's manuscript maps drawn by the master of the *Hero*; and (c) official records from the Custom House at New London, Conn. Other sources are: (d) the paper by William Herbert Hobbs entitled "The Discoveries of Antarctica within the American Sector, As Revealed by Maps and Documents," *Trans. Amer. Philos. Soc.*, Vol. 31 (N.S.),

the forenoon of the calendar day of November 17. The log of the *Hero* does not give the abbreviation "a. m." for the 10 o'clock entry, but previous notations in order from noon of November 16 are 2 p. m., 6 p. m., and 5 a. m. The course taken by the *Hero* when she was clear of the harbor and stood over for the land, south by east one-half east, points directly toward Antarctica. Let us see what Palmer recorded in the logbook of the sloop *Hero* on the epochal day when he actually reached Antarctica (Fig. 6).

Friday November 17th

These 24 hours commences with fresh Breeses from SWest and Pleasant at 8 P M got over under the Land [Trinity Island]. found the sea filled with imense [sic] Ice Bergs at 12 [midnight on the calendar day of November 17] hove Too under the Jib Laid off & on until morning—at 4 A M [on the calendar day of November 18, 1820] made sail in shore and Discovered—a strait—Trending SSW & NNE—it was Literally filled with Ice and the shore inaccessible we thought it not Prudent to Venture in ice Bore away to the Northerd & saw 2 small Islands and the shore every where Perpendicular we stood across towards friesland [Friesland or Smith's or Livingston Island] Course NNW—the Latditude [sic] of the mouth of the strait was 63-45 S Ends with fine weather wind at SSW.

The *Hero*, as recorded in the previous day's entry, cleared the harbor of Deception Island at 10 o'clock in the morning. The weather was pleasant, and there was a fresh breeze from the southwest. Accordingly she was able to cross Bransfield Strait to Trinity Island in ten hours, getting over under the land by 8 o'clock the same evening. The distance being about forty miles, she made four knots. That was good sailing for this 47-foot sloop, though Sir Hubert Wilkins in his airplane in 1928 made the same distance in twenty minutes over essentially the same course.

The conclusion that the land approached at 8 in the evening was Trinity Island rather than the Antarctic mainland is based on the course sailed. On the map (Fig. 2) the direction S by E 1 2 E has been corrected for a magnetic variation or declination of 25° east.³ By allowance for drift or windage at the known speed of the sloop under southwesterly winds, as well as for displacement by water currents and so forth, it has also been translated into what seamen call a "course made good." This leads directly from Deception Island to a point near the northeast cape of Trinity Island.

As the sea was filled with immense icebergs, it was natural that Palmer "laid off & on"—tacked to and fro under the jib—from midnight of November 17 to daylight on the morning of November 18.

At 4.00 a. m., when it was again light enough to see possible reefs and avoid floating ice, Palmer evidently sailed the *Hero* eastward and southward, since the strait he discovered was the Orleans Channel, which lies between the Antarctic mainland and Trinity Island. The evidence as to the identity of this strait is conclusive.

Palmer recorded that the latitude of the mouth of the strait was 63° 45' S. It is obvious that on a coast trending generally in a north-east-southwest direction there can be only one place in this latitude.

¹ E. S. Balch: Palmer Land. *Bull. Amer. Geogr. Soc.*, Vol. 43, 1911, pp. 282-283.

² The value of about 25° E for the magnetic variation in November, 1820, is based on actual records, checked by calculations made in the U. S. Hydrographic Office. The following shows the variations as recorded for different dates: (1) 1820, 23° 30' E at approximately 62° 18' S., 60° W.; (2) 1821, 25° E at approximately 62° S., 60° W.; (3) Feb. 5, 1821, 24° 24' E at 63° 6' S., 63° 4' W. (south end of Mt. Pissgah Island); (4) Dec. 14, 1821, 24° 45' E at approximately 62° 20' S., 60° W. (north of Desolation Island); (5) 1821, 25° 14' E at approximately 62° 25' S., 62° 30' W. (northwest of Presidents Harbor); (6) 1823, 27° 30' E at approximately 62° 29' S., 62° 15' W. (north of Mt. Pissgah Island); (7) 1820, 23° E at Deception Island; (8) 1932, 15° E at approximately 63° 22' S., 60° W. (a short distance east of Palmer's route from Deception Island to the Antarctic mainland); (9) 1937, 14° 30' E at same point as (8). Sources: (1) "Chart of New or South Shetland. Seen in 1819 by William Smith, Master of the Brig Williams, Surveyed by E. Bransfield, Master R. N. in 1820." British Admiralty, London, Nov. 30, 1822 (reproduced in W. H. Hobbs: *The Discoveries of Antarctica within the American Sector, As Revealed by Maps and Documents*, *Trans. Amer. Philos. Soc.*, Vol. 31 (N.S.), Part 1, 1939, Pl. 14, facing p. 38); (2) George Powell: *Chart of South Shetland, Including Coronation Island, &c. from the Exploration of the Sloop Dove, in the Years 1821 and 1822*, London, Nov. 1, 1822 (reproduced in Hobbs, *op. cit.*, Pl. 9, facing p. 32); (3) H. Gravelius, transl.: F. von Bellingshausens *Forschungsfahrten im Südlichen Eismeer 1819-1821, auf Grund des russischen Originalwerks herausgegeben vom Verein für Erdkunde zu Dresden*, Leipzig, 1902, p. 197; (4) Robert Fildeas: *Remarks Made during a Voyage to New South Shetland*, British Museum, Add. 30, 179 P. 30, 437; (5) see (2); (6) J. Weddell: *Chart of South Shetland, Constructed from Observations Made during Three Voyages in the Years 1820, 21, 22 & 23 to These Islands, in a Voyage towards the South Pole*, by James Weddell, London, 1825, facing p. 132 (also in edition of 1827); (7) *British Admiralty Chart 12, 18, 1830, and later editions*; (8) *ibid.*, 1203, 1933 (magnetic variation for 1932); (9) *ibid.*, 1937.

That place is the northeast entrance of Orleans Channel. Palmer gives no longitude, but in this case none is necessary for a precise location.

Moreover, Palmer recorded in November, 1820, that the axis of the newly discovered strait trended south-southwest and north-northeast. Using modern charts and giving proper weight to the magnetic variation, one sees that the trend of Orleans Channel as determined by Palmer is almost exactly right. Dumont d'Urville saw only the northeast end of Orleans Channel in 1838. Dallman merely sketched this channel in a general way in 1874. The French Service Hydrographique did not bring out until 1912 the large-scale chart of the South Shetland Islands showing the results of Charcot's explorations in 1904-1905 and 1908-1909. Accordingly, as the writer stated before the National Academy of Sciences at Washington in 1938, inasmuch as no one published a complete chart of Orleans Channel for 92 years after Palmer's visit in 1820, the Stonington sealer's record of the axial trend of this strait is a singularly attractive confirmation of the fact that he had been there.⁴

The logbook of the *Hero* shows that Palmer found the newly discovered strait to be literally filled with floating ice, that he considered the coast to be inaccessible, and hence that he thought it not prudent to venture into the ice of Orleans Channel.

PALMER THE FIRST TO SEE THE MAINLAND OF ANTARCTICA

It seems appropriate to recall here that the long, narrow, mountainous tongue of land which extends northward from the portion of Antarctica near latitude 71° S. was correctly considered to be a peninsula from soon after 1820 to 1928. In 1928 photographs taken from the air were thought to show several straits extending completely across the peninsula. Subsequent air photographs by the American Ellsworth, in 1935, as well as sledge trips by the Australian Rymill, in 1936, proved that these straits do not exist.⁵ Accordingly, there was a period when maps depicted a nonexistent Antarctic Archipelago, which included the portion of Antarctica where Palmer discovered the mainland on November 17 and approached near it on November 18, 1820. It was doubtless a momentary failure to recall this situation that led Lars Christensen to say in 1939 that Biscoe in 1831 was the first person to see Antarctica.⁶

Captain William H. Smyley was certainly using an erroneous map, perhaps Isaac Purdy's "Reduced Chart of the Ethiopic or Southern Atlantic Ocean," published in 1840, when he said that he had "sailed round Palmer's Land."⁷ Actually he sailed around the misplaced words "Palmer Land" which were printed on the sites of Brabant, Liège, Anvers, and adjacent islands.

Hitherto-undigested cartographic evidence, as well as fragmentary and long-known printed records, shows conclusively which of the Antarctic islands south of Cape Horn can be proved to have been seen in or before 1819-1820 by navigators from the Netherlands, Spain, Argentina, England, and the United States of America. There is no convincing information suggesting that the Antarctic mainland was seen between 1811 and 1814 by the American sealers or in 1819-1820 by the British trader Captain William Smith, the Argentine sealer Captain Carlos Timblon, the Connecticut sealer Captain James P. Sheffield, or the British naval officer Captain Edward Bransfield. D'Urville, a distinguished Frenchman, Fricker, a well known German, Aagaard, an eminent Norwegian, and Nordenskjöld, a learned Swede, two of them explorers who had themselves sailed

⁴ Lawrence Martin: *Palmer's Instrumental Observations in Connection with the Discovery of Antarctica*, *Science*, Vol. 87 (N.S.), 1938, pp. 465-466 (abstract).

⁵ W. L. G. Joerg: *Demonstration of the Peninsularity of Palmer Land, Antarctica, through Ellsworth's Flight of 1935*, *Proc. Amer. Philos. Soc.*, Vol. 82, 1940, pp. 821-832.

⁶ Lars Christensen: *Recent Reconnaissance Flights in the Antarctic*, *Geogr. Journ.*, Vol. 94, 1939, pp. 192-203; reference on pp. 192 and 193.

⁷ M. F. Maury: *Explanations and Sailing Directions to Accompany the Wind and Current Charts*, Washington, 1851, pp. 287-292, reference on p. 292; Charles Wilkes: *Narrative of the United States Exploring Expedition*, Vol. 1, Philadelphia, 1845, p. 145.

in the waters between the South Shetland Islands and the Palmer Peninsula of Antarctica, have independently studied the problem of the discovery of Antarctica. Each has reached the same conclusion: neither Bransfield nor any of his predecessors in these Antarctic waters, so far as can be shown by existing evidence, ever saw the mainland of Antarctica. The honor of discovery belongs to Palmer. The Hydrographic Office of the British Admiralty appraised Bransfield's 1820 cruise in the brig *Williams* fairly and correctly. Its century-long repudiation of the theory that he saw the mainland of Antarctica took many decisive cartographic forms. These conclusions will be amplified in a subsequent publication with full bibliographical references.

THE CREW OF THE "HERO"

Five Yankee sailors were present at the initial visit to Antarctica in 1820. Let us call the roll of honor. There was Nathaniel Brown Palmer, master of the *Hero*. He was 21 years old, having been born August 8, 1799. Only one of his four shipmates was younger than he. Palmer was three-quarters of an inch more than 6 feet in height and had light complexion and light hair. He was the son of Nathaniel Palmer and Mercy Brown, was married December 7, 1826, to Eliza T. Babcock, and died June 21, 1877.⁸ One of his seven brothers and sisters was Alexander S. Palmer, born January 26, 1806, who also participated in Antarctic exploration. Captain Nat sailed four different seasons in Antarctic waters between 1819 and 1831, made many voyages to the west coast of South America, to China, and to Europe, built many ships, and wrote many logbooks—but never a more important one than that which described his discovery of Antarctica.

There was Phineas Wilcox, the mate. He was 28 years old and 6 feet tall. In 1821–1822 Wilcox was again the mate of the *Hero* and, with Captain Harris Pendleton, went once or twice to the west coast of Anvers Island, where Biscoe subsequently landed. In 1830 he sailed westward from the South Shetlands to longitude 103° W. with Palmer's brother in the schooner *Penguin*.

There was Richard Fanning Loper, the second mate. He was 21 years old and 5 feet 6 inches tall. In later life Loper had a brilliant career as an inventor and shipbuilder. During both the Mexican War and the Civil War he directed the building and purchase of many ships and boats for the federal government, and his honesty and patriotism were attested by Abraham Lincoln.⁹ Captain Nat, Wilcox, and Loper were all born in Stonington, Connecticut, and the two mates matched the master of the *Hero* in complexion and color of hair.

Now for the crew of this little sloop. It consisted of two seamen. One was Stanton L. Burdick, a boy only 16 years old. Think of it! A lad of 16 was present at the discovery of a continent. Burdick stood 5 feet 3 inches and had dark complexion and dark hair. He was born in Rhode Island. The following year, when Stanton was 17 years old and had grown 3 inches, he was with Palmer on the *James Monroe* and accompanied him to the part of Palmer Land south of 68° S. and on the cruise that resulted in the discovery of the South Orkney Islands.

Finally, there was Peter Harvey, an American Negro, or, as the certificate reads, "Peter Harvy . . . a blackman." Harvey, a resident of Stonington and born in Philadelphia, was 31 years of age—the oldest man on the discovery vessel that historic day. Matthew Henson, a colored American, went with Peary and the Eskimos to the North Pole in 1909. Eighty-nine years earlier, in 1820, another colored American was present with Palmer and the Yankees at the

discovery of Antarctica. This participation in polar exploration is a truly interesting achievement on the part of our Negro citizens.

NAMING OF THE LAND DISCOVERED

Did Palmer name the land he had discovered? Yes and no. After he had seen it from Deception Island, he wrote in his logbook on November 16 that he "stood over for the Land." When he reached Trinity Island on November 17, he wrote in the logbook that he had "got over under the Land." Next day he said that he "made sail in shore" and found "the shore inaccessible." He modestly named Antarctica "the Land," with a capital *L*, and described it by saying the shore was inaccessible! Eighty days later, however, an illustrious Russian navigator named it Palmer's Land.

CONCLUSION OF THE CRUISE

After Palmer had sailed along the north and east coasts of Trinity Island in November, 1820, had gone into the northeast end of the previously unknown Orleans Channel, had approached the mainland he had seen before leaving Deception Island, and had determined its shore to be at that time inaccessible, the *Hero* bore away to northward.

The logbook shows that the weather was fine. The wind was south-southwest out of Orleans Channel. The Antarctic mainland was not a lee shore. It was only noon. Explorers may wonder why Palmer did not stay longer at 63° 45' S. and try to press through the ice-filled Orleans Channel in order to land on the hitherto undiscovered continent his eye had been the very first to see. The explanation is obvious. Palmer was not seeking continents. He was seeking seals. Orleans Channel is only four miles wide in the narrower part. The *Hero* may have been in mid-channel, or she may have been as close as an eighth of a mile to the mainland. In the clear light of that November forenoon Palmer saw that the shore was not only inaccessible but devoid of fur seals. Of course he would not have turned northward again without going near enough to the shore to see whether there were seal rookeries there. He did go close enough to see that there were sea leopards.

Fanning brings this out well. Palmer, he says, found the land to be an extensive mountainous country, more sterile and dismal if possible, and more heavily loaded with ice and snow, than the South Shetlands; there were sea leopards on its shore, but no fur seals; the main part of its coast was ice bound, although it was in the midsummer of this hemisphere, and a landing consequently difficult.¹⁰

There were no new fur-seal rookeries on the Antarctic mainland near Orleans Channel and Trinity Island, and at Presidents Harbor the crews of four sealing ships lay idle. Duty, not lack of interest, led Palmer to bear away to the north.

On his way, close to the continental border, Palmer records that he saw two small islands. These were, of course, Ohlin Island and Tower Island. It is not clear whether it was the coast of the mainland or the shore of these islands that was considered to be perpendicular. The compass direction north-northwest, when corrected for magnetic variation and otherwise made good, was essentially a true-north course. When Palmer says "we stood across towards friesland," he employs an American name that antedates the successive names, Livingston Island and Smith's Island. The latter name had also been applied to Mt. Pisgah Island, for which the name James Island has likewise been proposed. Friesland is spelled in various ways in subsequent parts of the logbook; but the geographical positions of Friesland Point and Friesland Peak leave no doubt regarding the identity of Friesland Island.

Having failed to find seal rookeries by his cruise to Orleans Channel, Palmer continued the real business for which Pendleton had sent

⁸ Spears, *op. cit.*; D. H. Hurd: *History of New London County, Connecticut*, Philadelphia, 1882, pp. 708-713; R. A. Wheeler: *History of the Town of Stonington, County of New London, Connecticut*, New London, 1900, pp. 524-525; E. S. Balch: *Stonington Antarctic Explorers*, *Bull. Amer. Geogr. Soc.*, Vol. 41, 1909, pp. 473-492, reference on p. 474; Samuel Hart and others: *Encyclopedia of Connecticut Biography*, Vol. 2, New York, 1917, pp. 9-10; *San Francisco Daily Morning Call*, June 22, 1877, p. 4; "Dictionary of American Biography," Vol. 14, New York, 1934, pp. 189-190.

⁹ Hurd, *op. cit.*, pp. 645-649.

¹⁰ Fanning, *op. cit.*, p. 435.

him southward. He sailed his sloop north across Bransfield Strait, discovered Yankee Sound between Friesland Island and Greenwich Island, a body of water subsequently called McFarlane's Strait and Duff's Strait. He demonstrated that the Sound had beaches with fur seal, some of them near the shores of the true Yankee Harbor. The master of the *Hero* then returned to Presidents Harbor. In all he had been absent seven days.

Two of the maps here reproduced are facsimiles of manuscript charts which may well have been drawn by Palmer, one showing Deception Island and Yankee Sound, the other the Sound on a larger scale (Fig. 5). The originals are among the Fanning Papers in the archives of the American Geographical Society.

Exploration of the Graham Coast of Palmer Peninsula, January, 1821

After an interval of sealing, Pendleton again sent Palmer out to locate seal rookeries for the next season's business. This second cruise was also notable for exploration. Nine reliable independent sources of information about this voyage are discussed in the following sections.

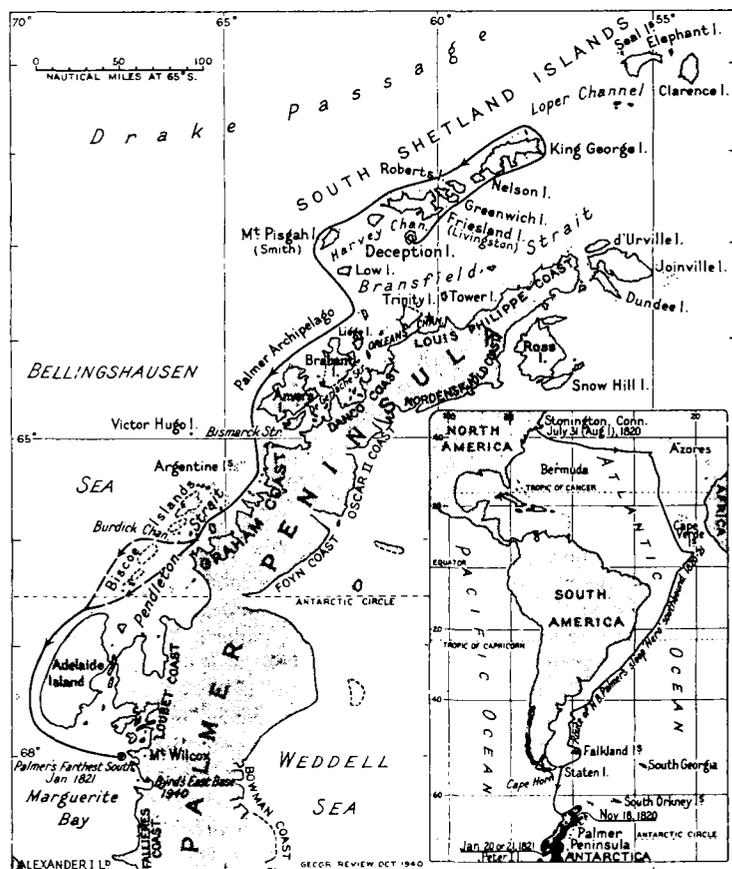


FIG. 8—Palmer's Antarctic exploratory cruise January 14 to 28, 1821. Routes south of Burdick Channel show alternative possibilities. The inset map shows the route from Stonington to Antarctica, 1820-21.

I. THE LOGBOOK OF THE 'FREDERICK'

"In the Brig *Frederick* log book Jan'y 14th 1821 says 'the sloop *Hero* Capt. N. B. Palmer Sailed to Eastward to look for more seal Is'ds'" (Fig. 6). This quotation is taken from an ancient manuscript memorandum now in the Library of Congress. It has not previously been printed accurately or completely. This document, probably written by Palmer's brother Alexander, includes a group

of transcriptions from the logbook of the flagship of Pendleton's fleet of five Stonington sealing vessels. The memorandum continues as follows:

same log book says on Jan'y 28th/21 [1821] '6 A M the sloop came in after examining [sic] North East and South West to their satisfaction for seal found none.'

Stopped at Camp took in about 4000 skins put on board *Frederick* 1200—employed getting shollop [sic] ready for a cruise. So ends this day.

Thirty-seven words summarize Captain Benjamin Pendleton's record of the cruise on which the littoral subsequently called Graham Land or Graham Coast was discovered. The genuineness of this evidence is confirmed in two ways. The twenty-four words of the second paragraph quoted above indicate by their commonplace nature that the first paragraph was actually copied from the log of the *Frederick* for January 14 and January 28, 1821.¹¹

An independent manuscript record in the Library of Congress (Fig. 7) demonstrates that on January 12 Captain Benjamin Pendleton withdrew the *Hero* from her duties as tender to the Stonington fleet. This document records the numbers of sealskins that the *Hero* "brought [from the] camps on the beach and put on the diferent Vessels."¹² The summary begins November 27, 1820, and ends January 12, 1821, when "2800 prime fur skins" were brought in. This was only two days before Pendleton sent Palmer out "to look for more seal Is'ds."

We shall see that Anvers Island, the Biscoe Islands, Adelaide Island, and the mainland of Antarctica from the longitude of Deception Island southwestward to the Antarctic Circle and on to Marguerite Bay in 68° S. must all have been discovered by Palmer in the *Hero* during the two weeks from January 14 to January 28, 1821; for the surviving evidence is by no means confined to what was written by Pendleton in the logbook of the *Frederick* on January 14 and January 28, 1821.

2. THE LOGBOOK OF THE 'HERO'

The logbook of the *Hero* (Fig. 7), however, is disappointing, for it does not give the full story of this cruise in January, 1821. For the first six days, from January 14 to January 19, the following entries are all that it contains:

	Sunday 14th
Commences with Light Breeze from SW	Pleasant
	Monday 15th
Commences with Light Breeze from NE	Pleasant
	Tuesday 16th
Commences with Fresh Gales from NE with snow	
	Wednesday 17th
Commences with Thick weather and Fresh Gales	
	Thursday 18th
Commences with Light winds and Pleasant	
	Friday 19th

There is no entry for January 19 and no further record until February 22, 1821, when the *Hero* "got underweigh for Sea."

The explanation of this lack of details is not far to seek. In the first place, Captain Palmer was not primarily interested in exploration. His main interest lay in sealing and, during the exploratory cruise of January 14 to 28, in looking for unknown coasts with unexploited seal rookeries. Pendleton, master of the *Frederick* and commander of the Stonington fleet, sent Palmer out "to look for more seal Is'ds." Two weeks later he recorded that the *Hero* had found no seals. He did not assert that Palmer had discovered no previously unknown islands or stretches of mainland coast. He merely reported

¹¹ For an incomplete printing of this identical transcription from the log of the *Frederick* see Spears, *op. cit.*, p. 66.

¹² See Balch, *Stonington Antarctic Explorers*, p. 481.

that the master of the *Hero* had found no beaches that were populous with fur seal in commercial quantities for the next season's catch.

It is not surprising that these records of American exploration in Antarctica are short and incomplete. One must read them with appreciation of their nature. Exploration, as such, was not the aim of the sealers. They worked hard, masters and seamen alike, and were perpetually tired. Palmer had a crew of only four men including the two mates; hence he worked as a seaman himself. Posting the logbook was necessary, but the entries were held down to the minimum. They were largely limited to records relating to navigation and sealing. The point is proved by an entry in another logbook of the *Hero*.

During the season of 1821-1822 Palmer was in the Antarctic again, this time as commander of the sloop *James Monroe*. The *Hero* was there, too, under command of Captain Harris Pendleton. Palmer in the *James Monroe* and Captain George Powell in the sloop *Dove* sailed together from the South Shetland Islands to the South Orkneys. In December, 1821, the masters of these two vessels carried on an extremely creditable voyage of exploration. They discovered a whole archipelago that no one had ever seen before. At the very moment of Palmer's return to the South Shetland Islands, after a 30-day voyage of 1200 miles in uncharted waters, Captain Harris Pendleton encountered Palmer and learned the outcome of the cruise to the South Orkney Islands. Then, thinking only in terms of seal rookeries, Pendleton covered the whole matter in his logbook entry for December 21, 1821, with the following laconic entry, a ten-word triumph of understatement: "spoke the Monroe Capt Palmer found he had did nothing" (Fig. 7).

The master of the *Hero* may have kept his full record of the days from January 14 to 28, and on to February 21, 1821, in a pocket notebook, intending to copy it into the logbook later when he had more time, but may have failed to do so before he sailed for Connecticut on February 22. Or he may have either kept it or copied it on ten pages that were subsequently torn out of the back of the logbook of the *Hero*, for in February he showed Bellingshausen a logbook and a chart; hence he must have written more extensive logbook entries for this two-week cruise of exploration than the one quoted above.

"And yet," as Spears pointed out in 1922, "during this interval of slack log writing Captain Palmer had been ordered to go a second time in search of other seal islands and while he was thus engaged he had discovered that part of the Antarctic Continent to which his name was given, and he cruised along the coast to 68 degrees south latitude."¹³

From the existing records of Palmer's two-week voyage of exploration in the last half of January, 1821, we cannot give at present all the details about where the *Hero* went between January 14 and January 28 or what her captain and crew saw. But we do know a great deal. She first sailed "to Eastward," for the log of the *Frederick* says so. She returned from the southwest, since this log speaks of their "examining [sic] North East and South West to their satisfaction for seal." The 16th and 17th of January were not days for seeing much: the log of the *Hero* records snow on the first day and thick weather the next. The 14th, 15th, and 18th were pleasant and were therefore good days for seeing new lands and waters. A group of reliable secondary records, however, add the following items of information, which are unquestionably to be attributed to the 14 days of exploration in January, 1821, and to the achievements of Captain N. B. Palmer rather than to those of one or another of his colleagues.

3. LETTER OF A. S. PALMER, 1879

On April 30, 1879, Alexander S. Palmer wrote to an inquirer:

¹³ Spears, *op. cit.*, p. 63.

¹⁴ See Balch, *Stonington Antarctic Explorers*, p. 478.

My brother discovered Palmer Land latter part of January or first part of February 1821. He proceeded as far south as 68° south Lat. in Long. 58° & 60° & odd west of Greenwich. No one had ever circumnavigated the Shetland Group before.¹⁴

N. B. Palmer himself told Bellingshausen that his sloop *Hero* was the first vessel which had circumnavigated the Shetland group

A. S. Palmer's 1879 letter definitely refers to the 14-day exploratory cruise in January, 1821, rather than the 7-day discovery cruise in November, 1820. It asserts that Captain Nat circumnavigated the archipelago and also indicates that he crossed the Antarctic Circle and must have gone as far to the southwest as Adelaide Island and Marguerite Bay, which is in 68° S., the longitude, however, being as rough as is characteristic of the period. The use of the name Palmer Land for the region as far south as Marguerite Bay is interesting and important.

4. LETTER OF D. W. CLARK, 1821

About this great cruise to and beyond the Antarctic Circle contemporary evidence of the highest quality is also furnished in a letter of Daniel W. Clark, first mate of the brig *Hersilia*. While he was still at Deception Island in the South Shetlands and only three weeks after Palmer's return from the cruise, Clark wrote as follows to the editor of the *New Haven Journal*, under date of February 18, 1821:

We have been as far south as 66 deg. and found land. How much farther the land extends I know not—it is entirely covered (except the low land and beaches where the seals come up) with snow and ice, at this season of the year which is the middle of summer.¹⁵

This statement, like that of Palmer's brother, shows that Captain N. B. Palmer was not at sea out of sight of land during the cruise but was near shore; and the question whether Palmer's southernmost latitude was thought by Clark to be 66° or 68° is relatively unimportant. As Clark's plural pronoun "we" is doubtless employed in a general sense, meaning "we Stonington sealers," the letter gives no definite evidence that Clark himself sailed southwestward with Palmer along the coast subsequently called Graham Land.¹⁶

It may seem curious that this second notable voyage of exploration by the master of the *Hero* was so unfamiliar to the world of scholars and mariners that Biscoe in 1832, rather than Palmer in 1821, has been erroneously credited with the discovery of the portion of the Antarctic coast near Adelaide and Anvers Islands. Of course, we had no geographical societies in America at that time, and our newspapers and magazines published no maps of the lands newly discovered by our navigators. There was ample announcement elsewhere, however. The French government,¹⁷ a daily paper printed in London, England,¹⁸ a popular sailing directory whose author was a hydrographer of the British Admiralty,¹⁹ and a revised version of the same sailing directory reprinted after a third of a century under the editorship of one of the Fellows of the Royal Geographical Society²⁰ all printed Clark's letter about Palmer's going to or beyond 66° S.

It does seem strange that these numerous and specific printed announcements of the visits of the Americans to the Antarctic coast in 1821 were overlooked at the time when John Biscoe's landfalls of 1832 were announced and the name Graham Land was proposed. There is not a word about Clark or Palmer Land in the *Journal of the Royal Geographical Society of London* for 1833, or in the second edition of this periodical, which was printed in 1838. And, with one notable exception, the same thing is true of the extracts from Biscoe's

¹⁵ Quoted from reprint in the *Providence Gazette*, May 9, 1821.

¹⁶ The U. S. Board on Geographical Names adopted on June 10, 1940, the following decisions: *Palmer Peninsula*: a peninsula in Antarctica south of Cape Horn, extending southwesterly and southerly from near lat. 63° S., long. 56° 40' W., to about lat. 71° S. (Not Palmer Land, Graham Land, nor Trinity Peninsula.)

Graham Coast: that part of the west coast of Palmer Peninsula, Antarctica, which lies between Marin Darbel Bay in about lat. 66° 30' S., and Bismarck Strait in about lat. 65° S.

¹⁷ *Annales Maritimes et Coloniales*, Vol. 14, 1821, Part 2, p. 670.

log in the Antarctic Manual published by the Royal Geographical Society in 1901.²¹

5. BISCOE'S REFERENCE TO PALMER, 1832

No one would think of denying that Biscoe's great voyage of Antarctic circumnavigation in 1831-1832 furnished the world of scholars with a bit more information about the southwestern part of the Palmer Peninsula than was known in 1821 when Palmer returned from his January cruise. But on February 4, 1832, this gallant English navigator frankly indicated in his logbook that he knew about Palmer's landfalls eleven or twelve years earlier. When he was still 1000 miles westerly from the Palmer Peninsula, not far from latitude 65° 32' S., and longitude 114° 9' W., Biscoe used the phrase "should we find any land in the neighbourhood of Palmer's Land." This spontaneous use of the name Palmer Land shows that Biscoe, as a competent seaman, must have been acquainted with one or more of the printed repetitions of Clark's announcement concerning the January voyage of the *Hero*.

On February 15 Biscoe saw the island he named for Queen Adelaide and determined its latitude and longitude. He thought that he went within three miles of it and that it was eight miles long; but Charcot subsequently concluded that Biscoe was 23 miles offshore and that the length of the island is 70 miles. The English explorer saw some of the Biscoe Islands, with high mountains behind on the mainland. He thought he had landed on the mainland, but it turned out to be only Anvers Island.²² His landfalls are highly creditable; but when we recover still more of the records of Palmer's voyage south to Marguerite Bay in January, 1821, we shall doubtless find that the American pioneer explorations were of equally high quality. For one thing, the master of the *Hero* must have stayed much nearer to the continent and the islands than Biscoe did, since Palmer had to satisfy himself as to the presence or absence of seal rookeries.

6. NOTE BY A. S. PALMER

Another item of evidence about Palmer's cruise to the southwestward was also recorded by his brother. "N. B. Palmer," he wrote, "informed the Russian admiral Bellinghausen. He went to Latitude 68° 00'. To Palmers Land, The nearest continent to the South Pole. '330 miles south of Yankee Harbor.'" ²³ This note is important for three reasons. By the use of the two zeros for minutes this mariner seems to indicate that the latitude 68° 00' S. was determined and not estimated. The mention of 330 miles shows that the cruise referred to could not have been the one in November, 1820, when the *Hero* had to sail only 50 miles to reach the Antarctic mainland near Orleans Channel and Trinity Island. The statement that Palmer told Bellinghausen about going 330 miles to 68° 00' S. demonstrates that the cruise could not have been the one Palmer is known to have made in November, 1821, since the American's meeting with the Russian took place in February of that year. Hence the note can refer only to the exploratory voyage to Marguerite Bay between January 14 and 28, 1821.

Marguerite Bay, beyond the Antarctic Circle, is a little more than 330 nautical miles in a direct line from Port Williams, on Deception

²¹ *The Courier*, London, June 11, 1821, pp. 2 and 4.

²² John Purdy: *Memoir, Descriptive and Explanatory, to Accompany the New Chart of the Ethiopic or Southern Atlantic Ocean*, London, 1822, p. 39.

²³ A. G. Findlay: *A Sailing Directory for the Ethiopic or Southern Atlantic Ocean*, 4th edit., London, 1855, p. 168.

²⁴ "From the 'Journal of a Voyage towards the South Pole on Board the Brig 'Tula,' under the Command of John Biscoe, with the Cutter 'Lively' in Company," in *The Antarctic Manual*, edited by George Murray, London, 1901, pp. 305-335. See also "Recent Discoveries in the Antarctic Ocean: From the Log-Book of the Brig Tula, Commanded by Mr. John Biscoe, R.N.: Communicated by Messrs. Enderby," *Journ. Royal Geogr. Soc.*, Vol. 3, 1833, London, 1834, pp. 105-112; *ibid.*, 2nd edit., 1838.

²⁵ See "The South Shetland and South Orkney Islands, With the Tracks of the Several Discoverers," *British Admiralty Chart 1238*, Sept. 7, 1839, and many later editions, including that of 1917 (publication discontinued in or soon after 1925); see also Mill, references in footnotes 26 and 27, below.

²⁶ See Balch, *Stonington Antarctic Explorers*, p. 478.

Island, the starting point of the January cruise, but of course the distance was roughly estimated by dead reckoning. It should also be observed that Palmer's brother in this document applies the name "Palmers Land" to the region south of the Antarctic Circle, as he did in his letter of 1879, and not merely to the portion of the mainland near Orleans Channel where the original landfall was made.

7. REYNOLDS' REPORT, 1828

Still another, and a very impressive, body of evidence about Palmer's 14-day cruise in January, 1821, has to do with Pendleton Bay, or Pendleton Strait, extending from 65° to 67° S. All that can be said about it here must be condensed into a few paragraphs. In a report drawn up at the order of the Secretary of the United States Navy in 1828, J. N. Reynolds made the following statements.

On the northern part of Palmer's land, and in latitude 66° 05' S., and about 63° W. longitude, Captain Pendleton [actually Captain N. B. Palmer] discovered a bay, clear of ice, into which he run for a great distance, but did not ascertain its full extent south.²⁷

The report goes on with two significant sentences that could have been based only on specific observation in Pendleton Strait, the great body of water between the Biscoe Islands and the Graham Coast of the Palmer Peninsula. "In those seas," Reynolds had been told before 1828, "the prevailing winds are from W.N.W. to W.S.W. and all gales from northeast. A gale seldom continues more than six hours. Clear weather from S.S.W. and S.S.E., which is not many days in a month."

Again the longitude is characteristically rough, but the latitude is entirely dependable. This was demonstrated by a great French explorer. Captain Jean Charcot, sailing these waters in the *Français* and subsequently in the *Pourquoi Pas?*, took Reynolds' report with him. After being in Pendleton Strait himself and keeping meteorological records, the French savant said they proved that the American had been there about eighty years before.

Almost exactly in the latitude indicated by the American whaler Pendleton [the American sealer Palmer] we succeeded, by passing between some of the more widely spaced of the Biscoe islands, in making our way into a vast bay encumbered by ice. The details given by Pendleton [to Reynolds, referring to Palmer's cruise] prove without question that he did cruise in this region, and I do not doubt for a moment that the bay indicated by him is really that rediscovered by us.²⁸

Certainly it was Pendleton's assistant, Palmer, rather than Pendleton who actually discovered this bay or strait; no doubt Pendleton was himself on the brig at Deception Island from January 14 to 28, 1821, while Palmer was cruising to the south in search of mainland or insular coasts with seal rookeries.

Even before the French explorer Charcot concluded that the Americans had discovered what came to be called Graham Land, the great English authority on the Antarctic, Hugh Robert Mill, had come to the same conclusion. In 1905 Mill said: "Biscoe was able to set foot upon what must have been the land discovered by Palmer . . . Recent expeditions have shown that this is a group of islands of no great size."²⁶ And in 1938 he said: "Biscoe, like Palmer before him, took it [Anvers Island] to be part of the mainland."²⁷ Thus this English geographer indicated that it was Palmer in January, 1821, rather than Biscoe in February, 1832, who discovered the mainland south of Orleans Channel as well as Loubet Land and Fallières Land.

²⁷ J. N. Reynolds: Report to the Secretary of the Navy dated September 24, 1828, *23rd Congr., 2nd Sess., House Doc. 105*, 1835, pp. 26-27; *Amer. State Papers, Class VI, Naval Affairs*, Vol. 4, Washington, 1861, p. 699.

²⁸ J. B. Charcot: *The Second French Antarctic Expedition, Geogr. Journ.*, Vol. 37, 1911, pp. 241-260; reference on pp. 250 and 252. See also the same: *Le "Français" au Pôle Sud, Journal de l'Expédition Antarctique Française 1903-1905*, Paris, 1906, pp. xxvii and 89; *The Voyage of the "Why Not?" in the Antarctic*, London, 1911, pp. 85 and 90; *El "Pourquoi pas?" en el Antártico*, Madrid, 1921, pp. 101-103.

8, 9. LATER STATEMENTS BY PALMER

Although Palmer did not record in the log of the *Hero* the latitudes and longitudes of the points he reached on each of the 14 days of his cruise to Marguerite Bay in January, 1821, we do have a statement about this cruise dependably reported from his own lips as well as one in his own hand.

At Hong Kong twenty-odd years later he told Mr. Frank T. Bush, the American consul, and Admiral Sir Francis W. Austen of the British Navy, about coming "in sight of land not laid down on my chart." He said:

I cruised for several days in order to satisfy myself that it was not an island. I ran into several bays [i.e. Marguerite Bay, Pendleton Strait, and other fiords on the Graham Coast] without meeting with seal, and headed northward, drifting along under easy canvas, 'laying to' at night.²⁵

As no other Antarctic cruise by Palmer could have been described in these words, he must have been talking about the cruise of January 14 to 28, for he goes on immediately afterward to describe his meeting with Bellingshausen on February 6, 1821.

"Among other things," N. B. Palmer wrote on March 13, 1876, referring to his conversation with Bellingshausen, "I informed him of our Trip to the South in Latt 68° & the discovery of a Land—(never before seen) and it was him that named it Palmer's Land."

Thus there is a large body of reliable evidence to show that Palmer explored the whole west coast of the Palmer Peninsula between January 14 and January 28, 1821.

PALMER AND BELLINGSHAUSEN

There are many other pieces of new information in the holograph letter quoted above. It shows that one or more of the Yankee skipper's Antarctic charts, made during his explorations in 1820 and 1821, were so useful to the great Russian navigator that he "took a copy on tissue paper." These copies of Palmer's manuscript charts are being actively sought in 1940 in Leningrad. The complete story of the encounter between the master of the little sloop *Hero* and the commander of the Russian frigate and sloop of war is too long for summary here.

Finally, as a result of Palmer's having traced the portion of the Antarctic coast between Orleans Channel and Marguerite Bay, it is possible that it was he, rather than Bellingshausen, who was the first person to discover land anywhere within the Antarctic Circle. The Russian discovered Peter I Island on January 22, 1821. The American discovered the coastal lands between Deception Island and Marguerite Bay during the fortnight from January 14 to January 28, 1821. If he took eight days or less to cruise southward to Marguerite Bay, in 68° S., Palmer might have seen and passed Adelaide Island, which lies south of 66° 32' S., by January 19 or January 20. The Russian and the American may even have made their initial landfalls south of the Antarctic Circle on the very same day.

PALMER'S OTHER ANTARCTIC VOYAGES

When the Yankee skipper met the Russian explorer, he was start-

²⁵ H. R. Mill: *The Siege of the South Pole*, New York, 1905, p. 161.

²⁶ In his "Historical Introduction" to John Rymill: *Southern Lights*, London, 1938, pp. 1-22; reference on p. 8.

²⁷ F. T. Bush: *History of the Discovery of Palmer's Land*, *New London Daily Globe*, September 10, 1881.

²⁸ Elephant Island was the desolate home of Wild and Wordie and a score of other members of the crew of the ship *Enderburt*, which had been crushed in the ice of the Weddell Sea. While men live and tell stories of the sea, they will narrate the odyssey of the *James Caird*, the 20-foot boat that Shackleton and five of his men sailed 800 miles in 1916 through malignant winter seas to the island of South Georgia. There is no more heroic voyage in the annals of the sea. Elephant Island! So beset with floating ice that Shackleton, returning with rescue vessels first from South Georgia, then from the Falkland Islands, and finally from Punta Arenas in the Strait of Magellan, was turned back three times before his fourth and successful relief expedition enabled him to rescue the twenty-two brave men who had lived on Elephant Island all that time.

ing on his third cruise during the sealing season of 1820-1821. He was en route to another locality where Pendleton hoped the master of the *Hero* might find fur seal—as he actually did—for the season of 1821-1822. He was on his way to the archipelago which he called the Seal Islands and which includes Elephant Island, famous as the starting point of Sir Ernest Shackleton's heroic voyage to South Georgia nearly a century later in the *James Caird*.²⁹ It would be gratifying if we could record that Elephant Island was discovered by Palmer in the *Hero* in February, 1821; but the credit belongs to Captain Edward Bransfield in the brig *Williams* 12 months earlier.

Palmer returned to the South Shetlands in November, 1821, and made two exploratory cruises in the sloop *James Monroe*. The first, in November, 1821, took him for a second time to Marguerite Bay, the second, in November and December, 1821, and January, 1822, to the South Orkney Islands, of which Palmer and Powell were joint discoverers.

Between 1829 and 1831 the Stonington sealer carried on a creditable voyage which combined sealing with scientific exploration in Patagonia, at Staten Island near Cape Horn, in the South Shetlands, through the Antarctic seas westward to longitude 103° 3' W., and in southwestern Chile.

It will also be remembered that Palmer, as a twenty-year-old second mate, had originally visited the South Shetland Islands in 1819-1820 with Captain James P. Sheffield in the brig *Hersilia*. Thus he took seven exploratory cruises in Antarctic waters between 1819 and 1831.

Palmer won great credit for the United States of America through discovering the world's seventh continent. He made a substantial amount of money in the sealing business. And he was an exceedingly able navigator. This is demonstrated by his sailing the *Hero* from Palmer's Hill to Palmer's Land—from the eminence overlooking Stonington Harbor to Marguerite Bay, in 68° S., between July, 1820, and January, 1821. It is only 7000 miles from Connecticut to Antarctica as the gull flies, but by Palmer's actual route (astutely crossing the Atlantic to a point not far from the Cape Verde Islands and then recrossing the ocean toward the coast of Brazil (Fig. 8) to take advantage of winds and ocean currents before sailing southward to the Falkland Islands, the Staten Island of southeastern Argentina, the South Shetland Islands, and the Palmer Peninsula) the distance was a round 10,000 nautical miles. This voyage Captain Nat accomplished in 100 days at sea. Small wonder that the master of the 47-foot *Hero* wrote: "It was with great difficulty that I could make the old Admiral [Bellingshausen] believe I had come from U States in so small a vessel."

THE GEOGRAPHICAL REVIEW

U. S. Reveals 4 Commem For New Year

Four commemoratives to be issued by the United States during 1971 have been revealed by U. S. Postal Service officials.

They will honor General Douglas MacArthur, the 150th anniversary of Missouri Statehood, Blood Donors and Antarctica events.

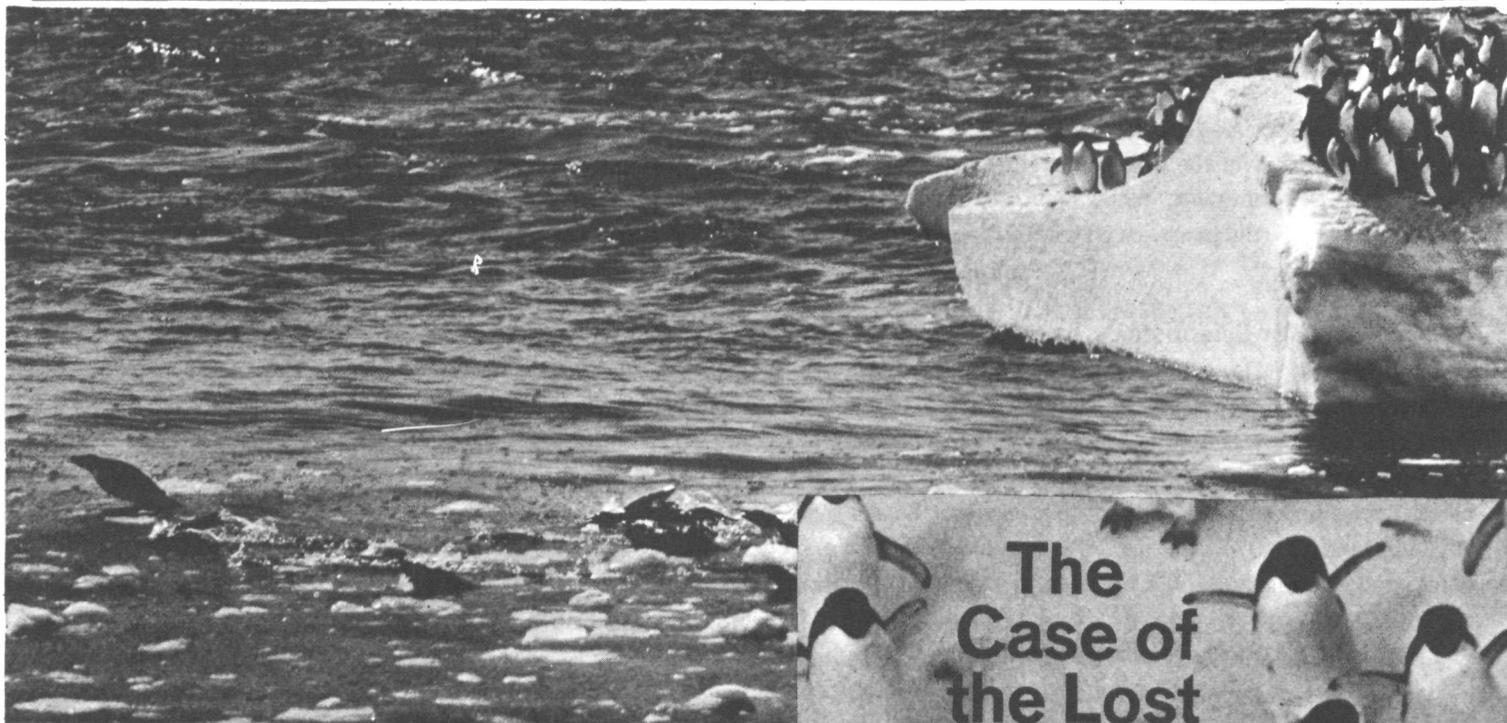
The report on plans to release an Antarctica stamp to honor the 10th anniversary of the treaty and the 150th anniversary of the discovery of the continent was the first to be made by the postal service.

June 23 is the 10th anniversary of the date the Antarctica treaty became effective.

Nations which have announced plans to issue Antarctica stamps next year are Argentina, Belgium, Chile, France, Japan, Norway, South Africa, the Soviet Union, United Kingdom and the United States. These nations and Australia met in Washington in 1959 for an Antarctica Conference and signed the treaty December 1 that year.

Cold Down There

A man working in the Antarctic region requires an average of 5000 calories daily to maintain body warmth. In a warm climate, 3500 calories is sufficient.

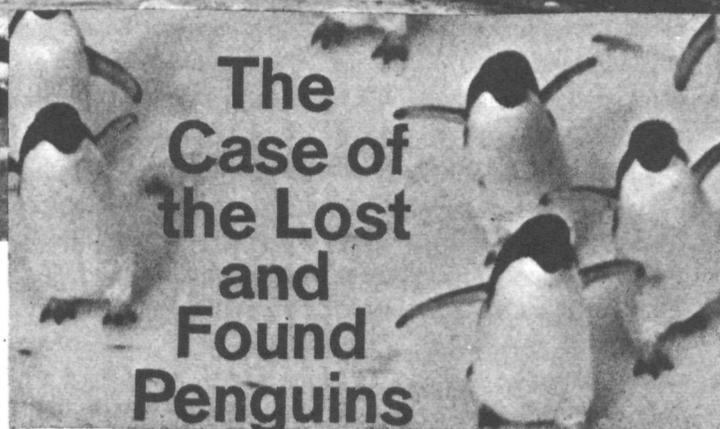
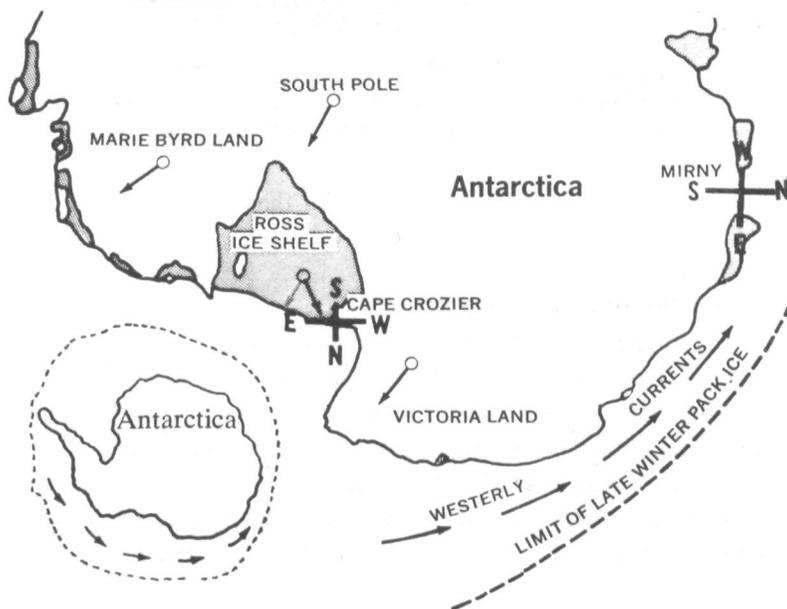


How do Antarctic penguins taken to unfamiliar locations on the continent find their homes by starting out in the opposite direction? Here's how scientists are trying to solve . . .

by Mary P. Goodwin

■ In December of 1966 three Adelie penguins came home to their rookery, or nesting place, at a place in Antarctica called Mirny (see map). They had traveled over 3,000 miles around the continental coast by swimming, walking, and sometimes sliding along on their stomachs.

The penguins were fat and healthy, and right away they **The green arrows show the directions taken by Cape Crozier penguins released at various places. The black arrow shows the direction taken by Mirny penguins released on the Ross Ice Shelf.**



began looking for their mates and piling up little stones into nests—as though they had been away for only a day or two. But in fact, biologists had taken these three penguins one quarter of the way around Antarctica and 110 miles inland and released them in a strange, white wilderness two years before. The biologists wanted to see whether the birds could find their way home. The birds did.

They did it on foot and without anything to eat for many weeks. They had no mountain ranges or other landmarks to help them recognize the land, no other birds flying overhead to follow, not even the smell of water to give them a clue. Yet they found their nesting places by the sea, walking there in an almost straight line.

Each spring, millions of Adelie penguins do much the same thing as they travel over many miles of ice and snow to reach their rookeries. Biologists have been trying for about 10 years to find out how the Adelie penguins are able to do this. By studying Adelies, they hope to learn more about how penguins and other far-ranging birds find their way back to their nesting grounds.

During the Antarctic winter, the Adelies live on the outer fringe of the pack ice (floating ice) that surrounds the Antarctic continent. There they are near the sea, which

is their only source of food. But each spring they travel south many miles over the pack ice to reach their nests on the coast of the continent. While they are building nests and hatching eggs, the penguins go without food for several weeks.

Cold Comfort for Scientists

There are other birds to study that live in places that might be more comfortable for scientists than the cold Antarctic continent. But most of these are flying birds that are very hard to follow. Penguins do not fly, and their black backs make them easy to spot against the snow-covered landscape. There are millions of Adelie penguins, and scientists are able to catch them easily at their rookeries.

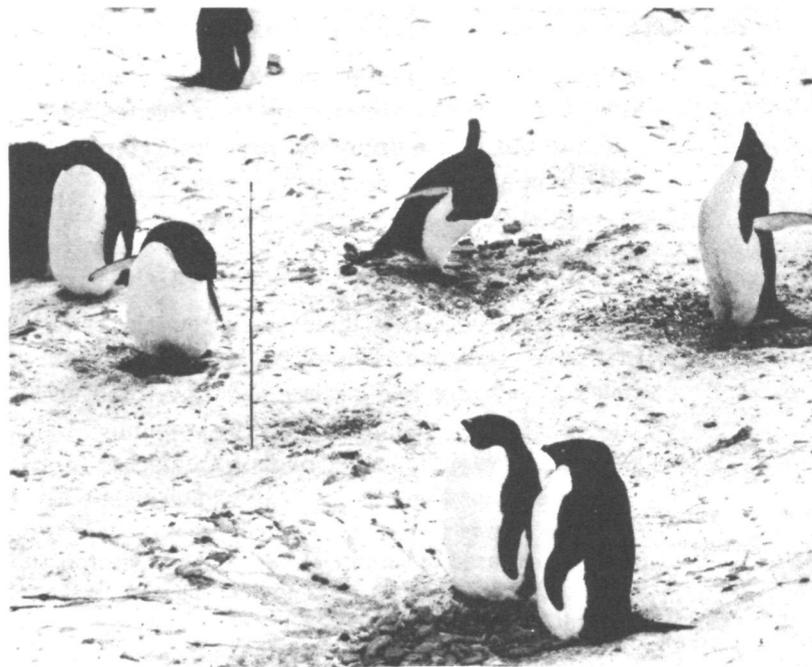
Two biologists who have studied Adelies are Dr. Richard L. Penney, a research zoologist at the New York Zoological Society (Bronx Zoo) and an assistant professor at Rockefeller University, in New York City, and Dr. John T. Emlen, a Professor of Zoology at the University of Wisconsin, in Madison. They wanted to find out what special senses and "signs" penguins use to guide them to their rookeries each spring, and how far the birds could travel to get there.

To find out, Dr. Emlen and Dr. Penney captured some fat, male penguins at an Adelie rookery at Cape Crozier (see map). They flew the penguins to a place 180 miles

southeast on the Ross Ice Shelf, a 150,000-square-mile floating ice shelf. The landscape there was bare, flat, and white, with no visible landmarks to guide the birds.

The biologists marked each bird with a numbered band on one wing. Then they let the birds go one at a time, and watched each bird's behavior.

Usually a bird made short dashes in many directions, but eventually steered toward the northeast. Other penguins from Cape Crozier were released at other places in Antarctica, and they also all headed in a direction that would take them to a place northeast of their rookeries if they kept going that way (see map). With the help of Russian biologists, the scientists also captured some penguins at the Russian research station of Mirny. When they were released on the Ross Ice Shelf, these penguins also



Adelie penguins build nests of small stones. Dr. Penney put numbered stakes beside nests of banded penguins. He found that the penguins returned to the same nests each year.

headed in a direction that would take them to a place northeast of their rookery (see box).

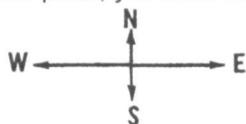
Why Take the Long Way Around?

Dr. Penney and Dr. Emlen wondered why the birds all headed northeast of their rookeries, instead of directly toward them (see map). One explanation was that the birds were taking the shortest way to the sea. There they could travel faster than on land and also find food.

The ocean currents also might have affected the penguins' direction. The currents around Cape Crozier and

North Can Be South in Antarctica

Look at the map showing the paths taken by penguins from Cape Crozier and Mirny when they were released on the Ross Ice Shelf. The article pointed out that the penguins headed in a direction that would take them to a place northeast of their rookeries. But you will see that penguins from Cape Crozier and Mirny did not all head the same way according to the map. Actually, if the Cape Crozier birds went northeast, it looks as if the Mirny birds headed northwest. This is true if we are talking about directions from the Ross Ice Shelf. But in Antarctica, north, south, east, and west change from place to place. In order to find directions on a map for a specific place, you must line up the symbol shown here over the place, with the "south" arrow pointing to the South Pole. That is what you see on this map at Cape Crozier and Mirny. You can see that directions are about the same for Cape Crozier and the Ross Ice Shelf. But look at Mirny. Have the directions changed? Can you see why scientists said all the birds headed toward places that were northeast of their rookeries?





Dr. John Emlen (above) records information during the penguin-navigation experiments. The instrument shown is a *transit*, a kind of telescope that was used to help track the penguins. Below, a scientist holds a penguin's head between his knees while placing a numbered band on the bird's wing.



Mirny flow westward. A penguin drifting on the pack ice would be slowly carried westward away from its rookery. So the biologists thought the penguins might have taken a slightly eastern course to make up for the westward currents.

But how are penguins able to choose a direction to follow in the first place? In the Antarctic wilderness of snow, the only guide these birds have is the sun. The biologists found proof of this when they observed how the penguins behaved in cloudy weather.

When the sun was covered by a thin layer of clouds,

the penguins had trouble finding the northeast direction. When heavy clouds covered the sun, the penguins were even more confused—choosing many different directions.

Setting a Sun Course

Using the sun's position in the sky to set a course is not easy, though. The sun does not "move" just from the east to the west each day. It also appears to move to different positions on the horizon. And in the Antarctic summer, the sun does not rise or set, but shines continually.

The penguins, however, were able to keep on their northeasterly courses even with the sun's different "motions." For instance, when birds released in the morning set off northward, that direction was to the left of the sun. At noon the birds were still traveling north, but they were going *toward* the sun because it had "moved." In the afternoon the birds were still on a northerly course, but they were heading to the *right* of the sun.

Because the birds were able to make up for the sun's constantly changing position as they used it to guide them, it seems that they must have a time sense that lets them know where the sun is at a particular time of day. Scientists call such a time sense a *biological clock*.

Not all of the penguins the scientists took inland and released made it back home, but many of them did—even though they had started out in the opposite direction. At least half of the Cape Crozier birds were back at their rookery within 25 days. And even though it seemed that the birds used the sun as a compass to guide them to the sea, the scientists still wondered how they finally found their way back home, since their rookeries were in the opposite direction. Dr. Penney and Dr. Emlen think the birds may find other clues to guide them to their rookeries when they reach the sea.

Dr. Penney is investigating more questions about penguin navigation in a special laboratory at the Bronx Zoo in New York City. There he can reproduce Antarctic weather conditions and even the sun's changing positions. Dr. Penney studies penguins he brought back from Antarctica and some he raised in this special laboratory.

He hopes to find more clues to the mystery of how the Adelle penguins navigate in Antarctica's vast wastes, where man can find his way only with complicated instruments ■

■ Dr. Richard L. Penney has written a book for children (ages 4 to 8) about some of his penguin studies (**The Penguins Are Coming**, Harper & Row, New York, 1969, \$2.50). Also look in your library or bookstore for these books about penguins: **Penguins**, by Bernard Stonehouse, Golden Press, New York, 1968, \$3.95; **The Penguin Book**, by Margaret Rau, Hawthorn Books, New York, 1968, \$3.95; **Penguins: The Birds With Flippers**, by Elizabeth Austin, Random House, New York, 1968, \$1.95.

Reptile Bones in Antarctica

WASHINGTON (AP) — A well-preserved skeleton of a 200-million year old cynodont reptile has been found about 350 miles from the South Pole. Its discovery has been linked to the belief that a supercontinent split apart about 150 million years ago to form pairs of present-day continents.

The National Science Foundation said the 10-inch cynodont reptile skeleton, related to the most primitive mammals, was discovered Nov. 10 by James Collinson, member of a team of geologists and paleontologists led by Dr. David Elliot of the Institute of Polar Studies at Ohio State University.

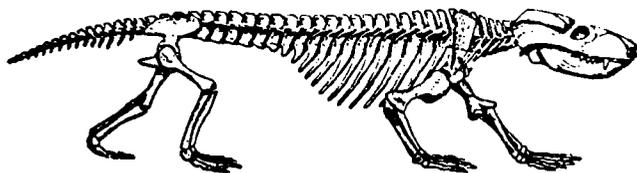
The cynodont was described as a four-legged carnivorous animal with dog-like teeth. It ranged in size from not much larger than a rat to about the size of a wolf.

Since the skeleton was found the team uncovered "a collection of fossil bones of great importance" and the collection was enlarged by the discovery of bone-bearing rocks by other members of the expedition, the foundation said.

Fossils discovered include parts of a dozen skulls of lystrosaurus the reptile discovered last year at Coal-sack Bluff, 150 miles northwest of the present camp on McGregor Glacier. The foundation added that a variety of small primitive reptiles had also been found and awaited further identification.

"The fossil bones," it was explained, "allow geologists to correlate rock strata within a 150-mile section of the Trans-Antarctica Mountains. Further, the researchers said some of the fossils were closely related to forms found in South Africa and gave much better inter-continental correlation between the rocks of Antarctica and other southern continents than heretofore possible.

"The Antarctic fossils are



Length of the cynodont thrinaxodon was 1½ feet

important paleontological evidence of the existence of Gondwanaland, the former super-continent composed of parts of South America, Africa, Peninsular India, Australia and Antarctica."

"Accumulating evidence from many fields indicate that Gondwanaland split apart about 150 million years ago and that parts drifted to their present locations. Recent evidence indicates the continents are still drifting."

UM Team Plans Antarctic Study

College Park, Nov. 9—A team of University of Maryland scientists, bearing a state flag to be given them tomorrow by Governor Mandel in Annapolis, will leave for the Antarctic Friday to do research that may enable man to modify the weather.

Dr. Theodore J. Rosenberg, a physicist at the university's Institute of Fluid Dynamics, said today that the three-man delegation will join researchers from Stanford University and the University of Oslo in Norway to collect data on X-rays using high-altitude balloons.

The information should furnish clues as to how charged particles that constantly bombard the earth's atmosphere might be used to selectively alter world weather conditions.

The three-month-long study will be conducted at a remote site near the South Pole as part of Operation Deepfreeze, a multi-nation co-operative study of the polar region.

In a State House ceremony tomorrow, a state flag will be presented to Dr. Rosenberg and the other two members of the College Park scientific team, Klaus Christoph and Ernest Grossenbacher, both research technicians at the institute here.

The state flag will be planted at Siple Station above a temporary laboratory carved into the ice.

The project is financed by a \$70,000 grant from the National Science Foundation.

Another University of Maryland group, also working under a foundation grant, already is working at the South Pole collecting air samples to study the spread of pollutants in the atmosphere.

Antarctic Search Set For Fossil

Reuter

SYDNEY, Australia—Eight geologists plan to comb an isolated mountain range in the Antarctic for a piece of bone only a few inches long.

This tiny fragment of fossilized material, embedded somewhere high up in the side of the mountain range, has been described as one of the most important fossil finds in Antarctica.

It is the jawbone of an air-breathing fish that had strong fleshy lobed fins with a well-developed internal bony structure.

Scientists believe these fish evolved into the first land mammals and specimens could include some of man's direct ancestors.

The scientific information officer at the Australian Museum here, Alan Hughes, said the fossil bone was first located by a 1968-69 team of geologists from the University of Victoria, Wellington, New Zealand.

"Unfortunately the team did not have the equipment necessary to extract it without danger of damage and were forced to leave it in the hope that a later group would recover it," he said.

"One member of the group which discovered it, Barry Kohn, is also a member of the present group so we're confident they'll be able to find it again."

Hughes described the fossil as a unique and important specimen. The 1970 team will

also attempt to recover fossilized lung fish specimens to prove that these fish once flourished in the rivers and lakes of the now barren continent.

The New Zealand expedition early in 1969 recovered a fragment of fossil, a little more than half an inch wide and about one-eighth of an inch thick, to provide the first evidence that lung-fish did exist in the Antarctic.

Hughes said these fish had a long documented history on most continents. Three of their specialized descendants still survive in South America, West Africa and Australia.

The importance of the finds is for the evidence they provide concerning early links between different continents.

Hughes said there was mounting evidence that continents were much closer in early geological periods and that Australia and Antarctica were in close proximity.

Britain Bars Soviet Effort To Build Whaling Station

LONDON, Nov. 14 (AP)—Britain has blocked a Soviet attempt to set up a whaling station on the South Atlantic island of South Georgia, a British crown colony.

Government officials disclosed this week that the Foreign Office had refused permission for the transfer to the Russians of a lease now held by an Argentine businessman, Alfredo Ryan.

Informants said that the British suspected the Russians sought facilities in South Georgia as part of Moscow's policy of extending its worldwide network of ocean bases.

6th Antarctic Meeting Opens

Reuters

TOKYO, Oct. 19—The Sixth Antarctic Treaty Conference opened here today for a two-week session with representatives from the 12 signatory countries attending.

They will discuss meteorological observation, protection of plants and animals in the Antarctic region, the Foreign Ministry said.

The United States, Soviet Union, Britain, France, Australia, New Zealand, Argentina, Belgium, Norway, Chile, South Africa and Japan are attending the meeting.

ANTARCTIC CALLED 'TREASURE CHEST'

Fabulous Mineral Wealth Is
Thought Likely Under-Ice

WELLINGTON, New Zealand (Reuters)—Fabulous mineral wealth, including diamonds, gold, platinum and oil, may lie under the icy wastes of the Antarctic, according to international scientists.

Apart from mineral wealth, the scientists said there could be rich food supplies in the southern ocean surrounding Antarctica, fossil finds of priceless value to science, and some of the most magnificent scenery in the world.

Forecasts of potential bonanzas have come at a time when the American Antarctic exploration program has slowed down.

The United States Ambassador to New Zealand, Kenneth Franzheim, warned after a visit to Antarctica that spending on the United States Navy's Operation Deepfreeze, totaling about \$22-million a year, was now "almost down to the bare bones."

The commander of Operation Deepfreeze, Rear Adm. D. F. Welch, said later that the United States hoped to continue its scientific exploration in new areas in the summer of 1970-71.

Admiral Welch said that the possibility of finding oil resources in Antarctica was based on the theory that it had been part of a super-continent that had drifted apart. Mineral finds in other parts of this continent such as South Africa, could be repeated in some parts of Antarctica, according to the theory.

The administrator in charge of New Zealand's Antarctic program, R. B. Thomson, said that diamond and platinum finds were expected in Antarctica. He added that the possibility of mineral finds would lead New Zealand to raise the whole subject of exploitation of the continent at a meeting in Japan next year of countries interested in Antarctica.

Mr. Thomson quoted the belief of a leading Soviet geologist that Eastern Antarctica might contain diamonds, gold, iron mica and coal—like Australia, Africa, Brazil and India, while Western Antarctica might contain lead, tin, copper and gold such as is found in the South American Andes.

One American scientist passing through New Zealand on his way back to Ohio State



Shoveling snow into melter at South Pole Station to make water



Changing a core of the PM-3A nuclear reactor at McMurdo Station

Antarctic Summer Lures Scientists

WASHINGTON — Scientists suspect the most remote corner of the Earth—the frozen vastness of the South Pole—may be threatened by air pollution.

Probably not very much. But six American scientists will spend the next few months there—during Antarctica's summer—looking for polluted air.

Traces of lead were found in the ice several years ago, and the frozen atmosphere will be tested for signs of metal pollutants to compare with the airborne lead, copper, iron, and aluminum found in Hawaii and the North and South Atlantic.

Proof already has been found that pollutants have long been carried to Antarctica by worldwide air currents. Ice cores drilled from the bottom of the polar ice cap in 1967 revealed dirty streaks of ash spewed into the atmosphere when a volcano erupted around 13,000 B.C.

The pollution hunters will be among the nearly 200 scientists and technicians from throughout the United States taking part in the 1970-71 United States Antarctic Research Project. National Science Foundation

University's Institute of Polar Studies carried with him a vital clue to Antarctica's past in the form of a 150-million-year-old fish fossil.

The scientist, Dr. D. H. Elliot, carried the 3-inch-long fresh-water fish fossil in his briefcase. The fossil, of a *Lysaurus*, was found in the Queen Alexandra Range, and is said to support strongly the idea of a drifting apart of the continents.

grants and contracts will largely support the investigations.

Some scientists believe they may find signs of other metal and mineral deposits in Antarctica: Gold, platinum, diamonds, and oil. Their hopes are pinned on the continental drift theory that appeared to be strongly supported by many bone fragments of vertebrates found last year.

United States geologists and geophysicists will be hunting for more fossil specimens in the central Transantarctic Mountains in the coming months.

The controversial continental drift theory argues that all the world's land masses—including Antarctica—split apart from a supercontinent and gradually migrated to their present locations.

Some scientists theorize that mineral deposits may have been broken apart when the continents separated, roughly like a printed sentence when a page is torn in two.

They point hopefully to the mineral and diamond deposits of South Africa, which many believe once adjoined Antarctica.

Other American geologists and topographical engineers, equipped with motor toboggans, will explore sections of the Antarctic Peninsula partly in support of an aerial mapping project during the current research season.

In a small outpost on the stark white snow plains near Byrd Station scientists will launch balloons carrying instruments to test the Earth's high

Is Mars Like the S. Pole?

PASADENA, Dec. 28

A four-man team of soil scientists headed by Dr. Roy E. Cameron of Cal Tech's Jet Propulsion Laboratory will be digging within 165 miles of the South Pole next month in a search for Martian similarities.

The team left for Antarctica recently on the expedition, sponsored by the National Aeronautics and Space Administration and the National Science Foundation, to find soil samples that could offer the closest approach to conditions that seem to exist on Mars.

The group will dig and test soil in the vicinity of 9600-foot Mount Howe on the edge of the polar plateau at the bottom of the earth, the closest known exposed land near the Pole.

Found Bacteria

Last year Cameron's group found bacteria 325 miles north of the pole, and in other regions still farther north they discovered a dozen other forms of life, including simple blue-green algae, yeasts, molds, mosses and lichens.

"This should be our closest approach to conditions that appear to exist on Mars," the scientist explained.

"Winter temperatures on the polar plateau have been measured as low as 130 degrees below zero. The polar caps on Mars, according to Mariner 6 and 7 flyby measurements, may be carbon dioxide ice and as cold as 200 degrees below zero."

atmosphere in studying cosmic radiation.

Radio transmitters and underwater television will be used in studies of antarctic seals on the sea ice near McMurdo Station. Other projects will find scientists investigating animal and plant life in the frigid ocean waters, measuring glaciers, and testing the extreme weather.

Adm. Donald MacMillan Dies; Pioneer Explorer of Arctic, 95



Donald B. MacMillan, holding one of his dogs, returning on the Bowdoin from 1922 expedition to Baffin Island.

The New York Times

PROVINCETOWN, Mass., Sept. 7—Rear Admiral Donald B. MacMillan, the Arctic explorer who was the last survivor of Robert E. Peary's history-making expedition to the North Pole in 1908-09, died here today in a nursing home at the age of 95.

His widow, Miriam, survives.

30 Trips to Far North By ALDEN WHITMAN

"While I would like to go into the Arctic for the adventure that it promises, my greatest desire would be to bring back to scholars of all kinds bits of useful knowledge about this little-known great domain."

In these words, written just after the turn of the century, Donald Baxter MacMillan expressed an ambition that he largely achieved in 30 expeditions to the Far North between 1908 and 1954. He was 34 years old on his first trip and a few days short of 80 when he completed his final journey.

An anthropologist, ethnologist, geographer and skilled naturalist, he made fundamental contributions to Arctic geology, botany, zoology and geography as well as to the understanding of Eskimo culture. He introduced the airplane to the Arctic, pioneered in the use of

shortwave radio there and was the first to use snowmobiles in the region. And in thousands of illustrated lectures across the United States, he made his knowledge available to the public and to generations of school and college students.

Oddly, the explorer, who became a rear admiral in 1954, never set foot on the North Pole; but he did fly over it in 1957 with three other Arctic veterans—Sir Hubert Wilkins, Peter Fruechen and Col. Bernt Balchen. His initiation into the North came through Adm. Robert E. Peary, whose son had attended, in 1900, a summer camp run by Admiral MacMillan, then a teacher. The two men corresponded, and Admiral Peary invited him to join the Peary expedition of 1908-09 as an assistant.

At the 85th Parallel, the neophyte nearly perished when he fell through the ice ("Peary held my freezing feet against his warm body to save them") and had to forgo the final stages of the trip, on which Peary insisted he had reached the Pole. Instead, Admiral MacMillan hobbled back along the trail to set up supply caches for Peary's return trip.

Undismayed by the hazards of polar life, Admiral MacMillan participated in the Cabot Labrador Expedition of 1910, in

the course of which, in a 16-foot canoe, he almost reached Hudson Straits under sail and paddle. It was "a marvelous trip," he said later, recalling how he had relied on his shotgun and fishing tackle for food and how he had found shelter beneath the canoe, hauled out on shore, or with the Eskimos.

Few white men were held in such esteem and affection by the Eskimos as Admiral MacMillan, whose Eskimo name was Nagelak, or Leader, for he strove to improve their health and living conditions and to create an understanding of their problems. Among other things, he compiled a dictionary of conversational Eskimo and established a school for Eskimo children at Nairn, Labrador, which he kept supplied with food and equipment for many years. He held Eskimo brain power in high regard, saying, "If they were not intelligent, they couldn't survive in that country."

Admiral MacMillan's attachment to the Far North began in childhood. He was born in Provincetown, Mass., on Nov. 10, 1874, the son of a hardy Scotch fisherman. His father, Capt. Neil MacMillan, was drowned off Greenland while fishing for halibut when Donny Baxter, as the boy was called in the Scotch tradition, was 9. His mother died shortly thereafter, and he was brought up in Freeport, Me., by an older sister. His imagination was never far from the sea.

After working his way through Bowdoin College in the class of '98, he became a teacher; and it was while he was at the Worcester (Mass.) Academy in 1908 that he received Peary's invitation to join his polar expedition. Although he never taught formally thereafter, save for anthropology lectures at Bowdoin, he stocked his Arctic crews with scientists and students to whom he passed along his accumulated scientific knowledge. His public lectures—and he was a magnetic speaker—were always thronged.

Admiral MacMillan's first polar trip in which he was commander was the Crocker Land Expedition in 1913. Starting out with 19 men and 165 dogs, he expected to remain in the North for two years and had to stay for four years until a relief ship made it to the west coast of Greenland. In this time, he and his sledges crisscrossed 10,500 miles of the Arctic, traveling the Greenland coast, Ellsmere Island, Exel Heidberg Island and the Polar Sea. The fare was often dog biscuit, birds' eggs and seal and walrus meat.

In addition to making basic geographical findings and to collecting 200 boxes of scientific specimens, Admiral MacMillan disproved Peary's

"discovery" of Crocker Land by showing that it had been a mirage. He told about his feats in a book, "Four Years in the White North," published in 1918.

In World War I, Admiral MacMillan served in the Navy Air Arm, and later in the Reserve; but in 1920 he was back in the North, this time in Hudson's Bay. The following year he was again in the Arctic on the first of a series of voyages in the celebrated schooner Bowdoin, a vessel of his own design that was double-ribbed and sheathed in ironwood and had a spoon bow able to lift up and crack down through an opening in an icefield. The 88-foot-long ship, graceful as a seabird, made 26 Arctic trips before being laid up. Her last voyage was in 1954.

On his voyages in the Bowdoin, Admiral MacMillan mapped the coast of Baffin Island; studied the great ice cap, Meta Incognita; found coal on Ellsmere Island; gathered biological specimens in Labrador; and offered evidence to show that the world was nearing the end of an ice age.

In World War II, the explorer was commissioned a Reserve commander in the Navy and dispatched to the Arctic with a ship and four planes. He made 10,000 aerial photographs of the Labrador, Greenland and Baffin Island coasts, and then worked with the War Department in establishing a Northern radar network and served on the Secret Defense Board. Nevertheless, some of his last years were passed in official neglect on a small pension.

Admiral MacMillan's final voyage, in 1954, was one of the hardest he had ever undertaken. The Bowdoin took a terrific beating from 120-mile-an-hour winds and shifting ice packs. Moreover, an Eskimo pilot, guiding the ship along the coast near Holsteinsborg, Greenland, ran her onto a ledge, and rocks ripped off part of her iron keel and ironwood sheathing. For five hours the vessel lay keeled over, with waves crashing into the hull. Then a high tide refloated her, and the admiral was able to take her into port, where she was beached and repaired.

For his exploits Admiral MacMillan received many awards, including the Medal of Honor, the Elisha Kent-Kane Gold Medal, the Explorers Club Medal and the Hubbard Gold Medal of the National Geographic Society.

Admiral MacMillan lived the last years of his life in Provincetown with his wife, Miriam, whom he married when he was 60. His deck was the porch of a shipshape home facing the Atlantic.

CAPT. ROBERT NORRIS OF COAST GUARD, 49

The New York Times

WASHINGTON, Dec. 16—Capt. Robert T. Norris, Coast Guard Deputy Chief, Office of Boating Safety, and chairman of the National Safe Boating Committee, died Sunday of a heart attack at his home in Arlington, Va. His age was 49.

From 1964 to 1966, Captain Norris served as a adviser in the political and security affairs section of the United States Mission to the United Nations.

In 1967, he commanded the Coast Guard icebreaker Staten Island on the Antarctic Operation Deep Freeze and also on Arctic-West operations, for which he received the Coast Guard Commendation Medal.

Captain Norris was born March 27, 1921, at Fort Dix, N.J., and was graduated from the Coast Guard Academy at New London, Conn., in 1943.

In World II, he served aboard the cutter Norhland on the Greenland patrol and took part in the sinking of a Nazi trawler after a 70-mile chase. He also helped capture 29 prisoners and a Nazi weather station in Northwest Greenland.

Surviving are his widow, Adele; a son James B. of Seattle; a daughter, Mrs. Beverly Manson of Cambridge, Mass., and a sister, Mrs. Richard Weller of New Port Richey, Fla.

CHARLES E. GILLHAM OF FIELD & STREAM

Charles E. Gillham, associate editor of Field & Stream magazine, died July 28 in a St. Louis hospital. He was 72 years old and lived in Edwardsville, Ill.

An outdoor writer and game biologist, Mr. Gillham had been assistant director of conservation for Winchester Western, the sporting arms division of Olin Corporation, before joining Field & Stream in 1956.

Earlier in his career he was with the United States Biological Survey in Arizona. In 1934 he transferred to the Canadian Arctic as a Federal waterfowl biologist. His arctic service resulted in four books, "The Raw North," "Sled Dog," "Beyond the Clapping Mountains" and "Medicine Men of Hooper Bay." He left Alaska in 1945 to join Winchester Western.

Mr. Gillham was also a member of the Explorers Club and the Outdoor Writers Association of America.

Surviving are his widow, Virginia; a son, Edward of Edwardsville, Ill.; a daughter, Mrs.

Malcolm Davis, 70, Dies

WASHINGTON, Oct. 6 —

Malcolm Davis, 70, former curator of birds who had traveled around the world in search of rare fauna for the National Zoological Park, died Sunday after a heart attack at his home in Herndon, Va.

Mr. Davis' travels took him through a howling Antarctic gale and blizzard on three trips to the South Polar regions with the late Adm. Richard E. Byrd and many bird, monkey and rhinoceros hunting expeditions in India, Burma, Africa and New Zealand. The rhino he brought back in 1940 was for many years the zoo's most costly possession.

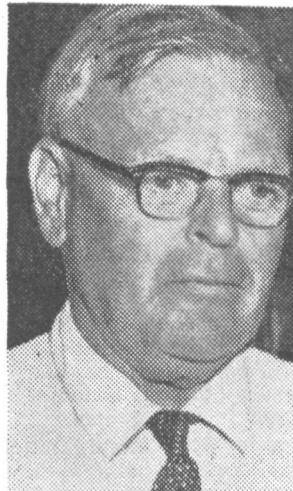
He also brought back alive to Washington the Zoo's first emperor penguin from Antarctica and its first Indian rhino. At one time Mr. Davis held the world's record for keeping emperor penguins alive. One lived in captivity more than six years.

A District native, Mr. Davis graduated from old Business High School, attended the University of Maryland and received a zoology degree from George Washington University. During World War I he served in the Army Signal Corps.

He joined the Zoo staff in 1927 and for 32 years collected specimens for it. He also made a number of trips for the Smithsonian Institution and on his own.

In 1941 he contracted psittacosis at the zoo while caring for infected birds.

In 1950 Mr. Davis, on leave of absence, was having dinner in Calcutta when he felt an earthquake. During the tremore he



MALCOLM DAVIS

observed a small tailor bird, which he wrote "may be the first record in ornithological literature (of the observation) of a bird during a terrestrial disturbance."

Also that year while on leave he processed rhesus monkeys for air shipment to the United States, mostly for the laboratories of the Polio Foundation.

Since retiring in 1960 as assistant headkeeper of the zoo Mr. Davis had been a consulting biologist with the National Wildlife Federation.

Mr. Davis was a member of many scientific groups including the American Ornithologist Union and the Explorers Club.

He leaves his wife, Nellie S.; a sister, Evelyn Davis of Herndon, and a brother, Fremond, of University Park, Md.

J.G. Mathes, Made Devices That Aided Byrd at Pole

WASHINGTON, July 11 —

John George Mathes, 80, who made the barometers that went with Admiral Richard E. Byrd to the North Pole, died Thursday at Suburban Hospital of diabetes and high blood pressure. He lived at 4824 Chevy Chase Blvd., Chevy Chase.

After graduating from Millersville Normal School, Mr. Mathes went to work as a mechanic for the Post Office and then became an instrument-maker for the Weather Bureau.

John Cizek of Darien, Conn.; two brothers, Norman F. and W. C. Gillham, both of Benton, Ky., and two grandchildren.

It was while with the bureau that Mr. Mathes constructed the barometers.

He was with the Weather Bureau until he retired in 1952 after 35 years in government service.

Mr. Mathes is a past grand commander of the Knights of Templar, grand high priest of the Loyal Select Masters, grand master of the Council and was secretary to the appointed high priest of the Masons for the last 30 years.

Mr. Mathes leaves his wife, Clara L.; a daughter, Mrs. June Hansen of Silver Spring, and a sister, Mary R. Mathes of Lancaster, Pa.

CANADA SETS RULES FOR ARCTIC PIPELINE

The New York Times

OTTAWA, Aug. 13—The Government announced a set of guidelines today to safeguard Canadian interests on any pipelines to take oil and natural gas out of the Northwest Territories, the Yukon and Alaska.

Officials said that major companies had expressed interest in building a pipeline, although the only fuels discovered so far in commercial quantities are in deposits near Prudhoe Bay, Alaska.

Canada will permit only one line each for oil and gas through a corridor to be established later.

J. J. Greene, the federal Minister of Energy, Mines and Resources, said that Canadian gas and oil, if discovered, must have access to any pipeline that is built.

The Government also will insist on the preservation of the Arctic's ecology, at least a share of the ownership of the pipelines and an opportunity for the employment of Canadian northerners, including Eskimos and Indians.

The Government also stipulated that any pipelines must provide service at published tariffs, or on contract at a negotiated price.

Exploring Priests Return With Rare Arctic Plant

LATROBE, Pa. (Religious News Service)—An uncle-nephew team of priest-scientists returned here from a two-month expedition in the Yukon Territory where they sought and found a rare arctic grass-like plant.

The Rev. Maximilian G. Duman, O.S.B., and his nephew, the Rev. Duane M. Duman, O.S.B., are members of the faculty at St. Vincent College here.

Father Max, called by many the "Arctic priest," was making his 12th expedition, while his nephew was on his first. The older priest described the 10,400-mile journey a success in every aspect. He reported that 5,000 specimens were collected.

Peninsula Dips

MOSCOW (Reuters) — The Kola Peninsula, in the far north of European Russia, is dipping slowly towards the White Sea, according to Soviet scientists. TASS said they had discovered the western end of the peninsula was rising .2 to .3 inches a year.

Hickel Order to Protect Whales Won't Be Suspended

The New York Times

WASHINGTON, Nov. 28 — The Interior Department backed away tonight from a move to suspend an order by its ousted Secretary, Walter J. Hickel, that was designed to protect endangered whales.

One of Mr. Hickel's last official acts was an order placing eight species of whales on the endangered list and, thus, banning the importation of products derived from them. And one of the earliest actions of the department after his ouster by President Nixon was a move to hold up publication of the order in The Federal Register. Publication is required before the order can become official.

Tonight, however, it was disclosed that the order would be published in The Federal Register on Monday as scheduled, and Deputy Under Secretary William Rogers, whose phone call to the Government Printing Office had held up the order, was quoted by an aide as terming his action a "ghastly mistake."

The politically sensitive question arose yesterday after the sudden dismissal of six of Mr. Hickel's aides. One of the aides was Dr. Leslie L. Glasgow, Assistant Secretary for Fish, Wildlife and Parks, who is known to have had a role in the move to protect the whales.

The move to suspend publication of the order immediately attracted wide attention and had been expected to draw sharp attacks from conservationists. Speculation arose over the sources of the order. Today, a rough picture of what had happened emerged.

The action delaying the order stemmed, it is said, from a telephone call from U. Alexis Johnson, Under Secretary of State for Political Affairs, to Mr. Rogers, asking that publication of the Hickel order be stopped.

The State Department has for some time been attempting to negotiate a reduction of whaling through the International Whaling Commission, and it objected to the unilateral move by the United States. Mr. Johnson is understood to have made these points to Mr. Rogers, who then placed the call to stop publication.

Makers of pet food and cosmetics and other users of whale products in the United States had also objected to the ban during extended hearings held at the Interior Department before Mr. Hickel issued his order.

Interior Department sources

Whales Face Extinction

By BERNARD WEINRAUB

LONDON

An international scientific committee urged recently that further restrictions be placed on whale hunting, including a reduction in catch quotas.

In a report to the 15-nation International Whaling Commission, the scientists warned of dangers facing the whales throughout the world.

"Some stocks in the Southern Hemisphere show signs of depletion," the report of the scientific committee, representing the United States, the Soviet Union and five other countries said. "In the Northern Pacific," it said, "male sperm-whale stock has apparently now reached a level at which there is little or no further surplus and it is desirable to slow down the decrease of male stock in view of apparent excessive catches."

Soon after the war, an international agreement placed a ceiling on the total number of "blue-whale units" that could

said the ban was being held up pending further study.

Tonight, however, E. U. Curtis Bohlen, a staff assistant in the office of Under Secretary Fred J. Russell, said that the publication of the order would go ahead as scheduled.

Hickel's Order Protecting Whales Goes Into Effect

WASHINGTON, Dec. 2 (UPI) — The Interior Department's ban on imports of products from eight whale species became effective today.

The order was prepared by Secretary Walter J. Hickel, who was dismissed before it was published in The Federal Register. It was published today.

Mr. Hickel invoked the five-month-old Endangered Species Conservation Act to protect eight varieties of whale—finback, sei, and sperm, which are hunted by commercial whalers, and the rarer bowhead, blue, humpback, right and gray whales.

Charcoal Dose Cures Whale's Stomach Ache

AURORA, Ohio (UPI) — Veterinarians here congratulated themselves on curing what might have been the biggest stomach ache in the world.

After consultations with colleagues in San Diego, the veterinarians gave Shamu, a 4,000-pound performing killer whale at sea world, four ounces of activated charcoal in powder form. Shamy had been seen swallowing a piece of dead fish.

be caught in the Antarctic by ocean-going whaling fleets.

The units are the whaling commission's scale for measuring catches. One blue-whale unit now equals two fin or six sei whales. Therefore, the current limit of 2,700 whale units for the Antarctic means a quota of 5,400 fin whales, which weigh about 110 tons, or 16,200 sei whales, the smaller, 50-ton species.

At present the commission has imposed a total catch limit of 2,700 whale units for the Antarctic — the main breeding grounds for whales. The United States and several other countries are believed pressing for a further reduction, possibly to 2,500 whale units, although this is opposed by Japan a key whaling country.

Thirty years ago, there were nearly 100,000 blue whales. These are the largest whales, as long as 100 feet and weighing as much as 130 tons. Today, there are fewer than 3,000 blue whales.

During the 1950's there were nearly two dozen factory ships that converted whales to meat and oil. Today there are only six factory ships, with the Soviet Union and Japan emerging since World War II as the two major whale-hunting countries.

"There is, of course, a danger of extinction and that's what we're trying to prevent," said the chairman of the five-man American delegation, Dr. J. L. McHugh of the National Science Foundation, who is chief of the office for the International Decade of Ocean Exploration.

"The essential problem is how large a harvest can safely be taken without affecting the whale's capacity to reproduce," he said, during a break in the 22d annual Whaling Commis-

sion meeting in River Walk House, a Government office building overlooking the Thames.

"In every animal, nature invariably produces a surplus," he went on. "This surplus is balanced through death — there's an equilibrium — and the problem for man now is harvesting this surplus of whales, a surplus that would otherwise die off, without harming the whales' capacity to reproduce."

"Man is, after all, just another predator," he said.

The other nations represented at the whaling conference were Argentina, Australia, Britain, Canada, Denmark, France, Iceland, Mexico, the Netherlands, Norway, Panama and South Africa. It closed its doors to the public for discussions on two key items: the 1970-71 whale catch quota in the Antarctic and a series of delicate proposals for international observer teams to insure that the whalers keep to their quotas.

The proposals have been discussed for a decade but both the Soviet Union and Japan remain cool to this effort.

"Neither side wants the other to see their whaling operations," said one observer close to the conference. "The Russians don't want Japanese observers on their ships, while the Japanese don't want Russians on shore stations along the Japanese coast."

In the technical report the scientists discussed the status of numerous whale species, ranging from the great blue and humpbacked whales, with their reservoirs of meat and oil, to the smaller sei and fin whales, which are now the prime target for ocean fleets.

With the killing of blue and humpbacked whales banned in recent years, the committee recommended a three-year extension of the restriction, starting in 1971.

The decline of whales began even before World War II, when Norway was the major international whaler. Through the war years, however, there was little hunting in the Antarctic, and the decline eased.

But whales are not rapid breeders. The females have calves only every two and a half years or so. It is recognized that unrestricted catches would soon eliminate whales.

Chaplain Busy At DEW Line

By JIM GIBNEY
Denver Post Staff Writer

SONDRESTROM AIR BASE, Greenland—A former Army chaplain has a congregation of about 750 Americans and Canadians "and some Eskimos" along 3,600 miles of the Arctic's frozen frontier. The Rev. Harry C. Hand, 53, a Southern Baptist minister from Stanley, N.C., has flown "about a million miles" since 1960 to remote radar sites along the Distant Early Warning Line (DEW Line) that stretches across Alaska, Canada and Greenland.

The DEW Line sites would give warning of an attack by enemy aircraft flying over the top of the globe.

A Denver Post reporter-photographer team met the Rev. Mr. Hand recently at Sondrestrom Air Base on the east coast of lower Greenland.

The Arctic chaplain was waiting for a ski-equipped Air Force plane to fly him to three DEW Line sites on the polar ice cap on the world's largest island.

The "flying parson" is one of five preachers—three Protestant ministers and two Roman Catholic priests—hired by Arctic Services, Inc., Paramus N.J., a division of International Telephone and Telegraph's Federal Electric Corp.

The North Carolina preacher, who spent 13 years as an Army chaplain from 1945 to 1958, visits all 34 DEW Line sites. The other four chaplains each have six to eight sites to cover.

The Rev. Mr. Hand said it takes him about six months to "bum rides" to all the Arctic radar sites. All of the sites have airstrips and can be reached only by air.

When he goes home for a month's vacation each year, the North Carolina minister, who performs nondenominational services on the DEW Line, visits with his wife, Saintie, in Stanley, and their daughter, Stephanie, 21, a senior at Gardner-Webb College in Boiling Springs, N.C.

When he is able to, he gets

an air hop to Kevlavik, Iceland, where his son, James, 25, works for ITT.

The Rev. Mr. Hand went to work for ITT on the DEW Line in 1960 and left in 1965 for a management job with the Job Corps at Camp Kilmer, N.J., returning to the Arctic last October.

Asked why he is willing to isolate himself from his family and the rest of the world, the Arctic chaplain said he became disenchanted with the institutional churches in America.

"I would like to see the Christian church come to grips with the problems of the nation," he said. "The churches have lost touch with the people. They are only concerned with building large memberships and creating fine, big churches and grand cathedrals."

The ITT minister said he considers himself "an industrial chaplain who must go where the people are."

His visits on the DEW Line run from one day to a week, depending on his ability to get a plane to the next radar site.

Six main stations on the DEW Line each have 70 men, he said, with the other 28 auxiliary stations each having 10 to 12 men. The average age of the radar technicians is 25. The outside power-plant employees are 45 to 50 years old.

Personnel at the auxiliary stations are U.S. citizens in Alaska and Greenland and Canadians at the Canada DEW Line sites.

The duty tours of employees last one year and the annual pay runs \$17,000 to \$20,000. Employees in Canada and Alaska must pay federal income taxes to their respective federal governments, but U.S. employees in Greenland have all their pay exempt from federal income tax if they remain on the job in Greenland for 18 months.

The Rev. Mr. Hand said all of the men on the DEW Line are there for one main purpose—to make money. Some, he said, also feel that their job is important.

He finds that the men are



PASTOR IN A FROZEN FRONTIER

The Rev. Harry C. Hand who visits all 34 DEW Line sites goes home once a year to visit family in North Carolina.

lonely and have the same troubles other men have—money, women and drinking.

A few develop mental problems and two have committed suicide since 1956, the Arctic chaplain said.

For the most part, he said,

the men along the DEW Line are "mainly contented" and have good food, music, books and a bottle to enjoy when they aren't working.

"Even the atheist has something to think about up here," the Rev. Mr. Hand commented.

GREENLAND DEPENDS ON FISHING INDUSTRY

WASHINGTON — Greenland is gambling that shrimp and cod have taken up permanent residence in waters vacated by seals, the National Geographic Society Reports.

More than 100 years ago, the seals began moving farther north as cold waters receded in the present warming trend. Schools of fish appeared off Greenland's coast in the 1920's, and today trawlers have replaced kayakers.

With all but 132,000 of Greenland's 840,000 square miles buried under the icecap, most of the 47,000 Greenlanders turn to the sea to make a living.

Denmark spent \$530-million on its Arctic province during the last decade—much of it on projects to induce Greenland's scattered population to move from tiny hamlets into cities large enough to support commercial fishing operations.

Greenlanders are moving to the cities to work in fish-processing plants and canneries. Building up Greenland's fishing industry is a calculated risk.

Scientists warn that the warming trend could end as suddenly as it began

VP Who Made Good

Fairbanks, Alaska, was named for American Vice President Charles Warren Fairbanks.

JUDGE USES DOGSLED ON ALASKAN ROUNDS

NOME, Alaska (AP)—Superior Court Judge William H. Sanders of Nome, whose judicial district covers 145,180 square miles, visits Eskimo villages by bush plane, modern jet and dogsled.

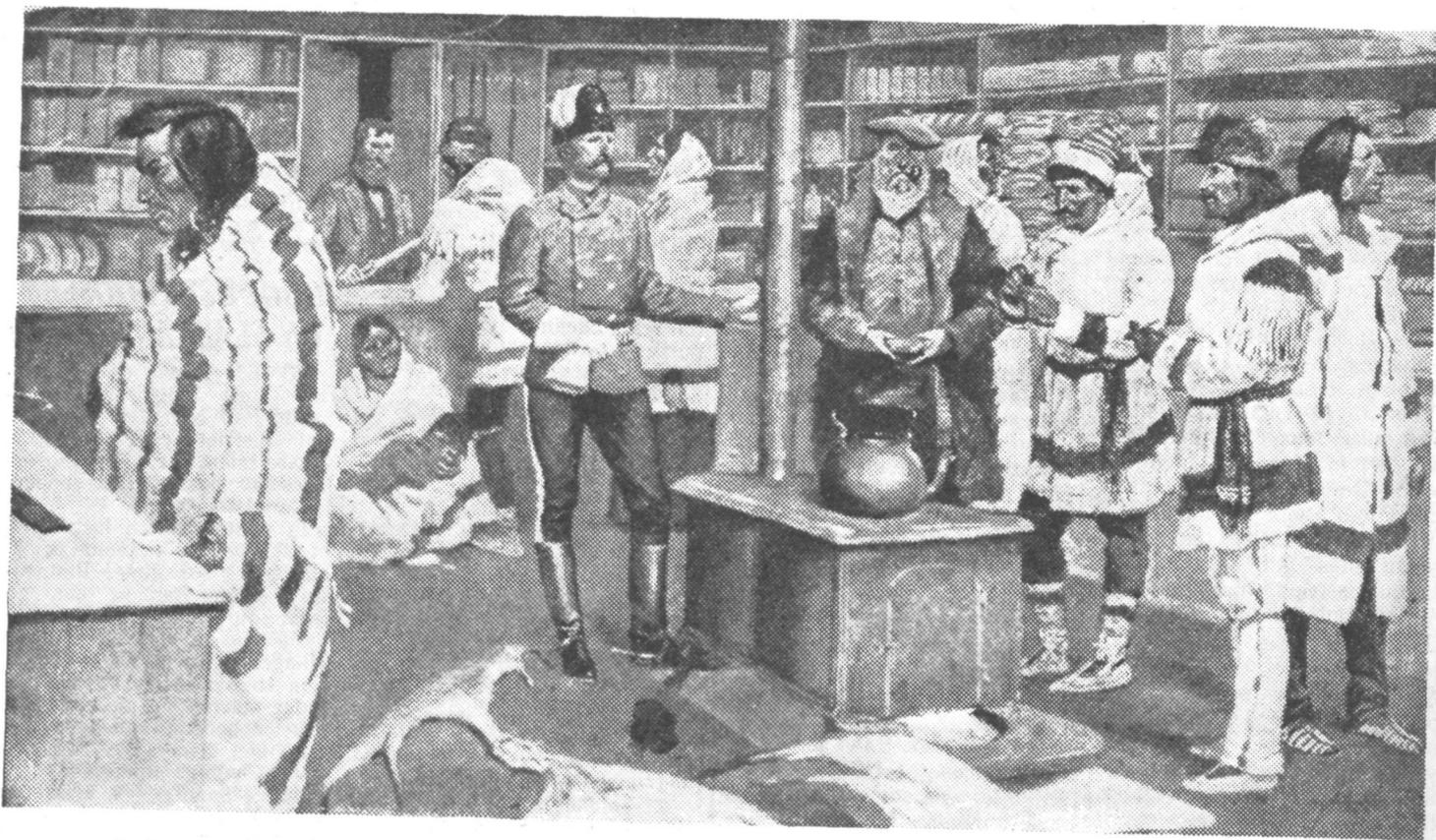
In winter, which lasts most of the year, a team of 10 huskies is sometimes the only way Judge Sanders can get from court to court.

He tries to visit most of the villages twice a year. In addition to dispensing justice, the judge marries people, gives advice on housing and legal matters, and always leaves candy for the village children.

Judge Sanders, 49, years old, attempts to gear his travels to seasonal problems in the vast area between the Yukon River and the oil-rich North Slope



SKILLED FISHING: Eskimos using gaffs to catch fish north of the Arctic Circle in Canada.



A painting of barter being carried on in one of Hudson's Bay Company's old trading posts in Edmonton, Canada