ANTARCTIC

A NEWS BULLETIN
published quarterly by the
NEW ZEALAND ANTARCTIC SOCIETY (INC)

DOG POWER STILL HAS A MODEST PLACE IN ANTARCTIC TRANSPORT. HERE A NEW ZEALANDER AT SCOTT BASE TRIES TO SORT OUT A TANGLE IN HIS TEAM OF HUSKIES. SCOTT BASE HAS A PACK OF 19 HUSKIES—AND SIX PUPS.

Antarctic Division, D.S.I.R. Photo: Neville Peat

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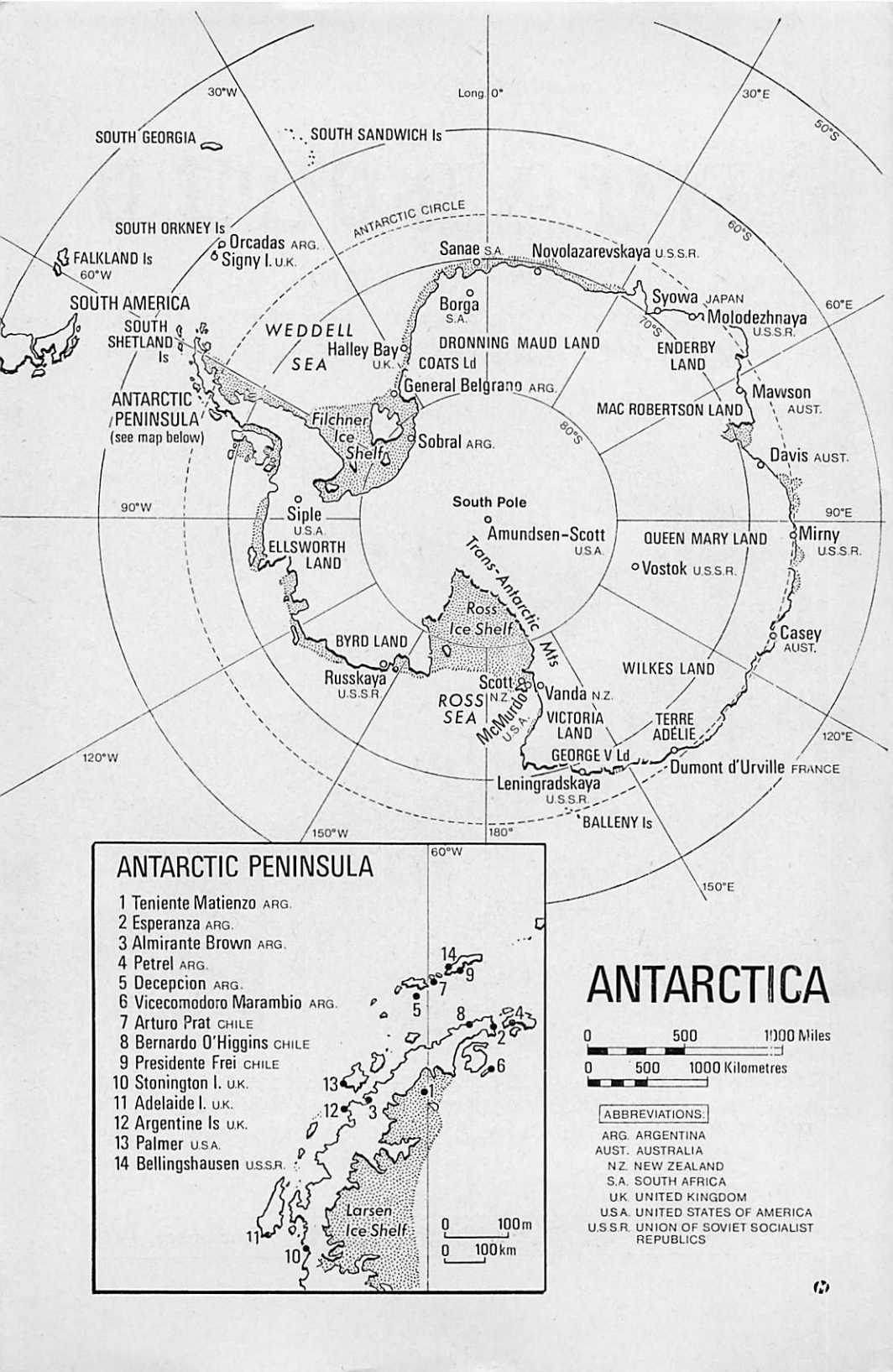

ANTARCTIC PENINSULA

1 Teniente Matienzo ARG.
2 Esperanza ARG.
3 Almirante Brown ARG.
4 Petrel ARG.
5 Decepcion ARG.
6 Vicecomodoro Marambio ARG.
7 Arturo Prat CHILE
8 Bernardo O'Higgins CHILE
9 Presidente Frei CHILE
10 Stonington I. U.K.
11 Adelaide I. U.K.
12 Argentine Is U.K.
13 Palmer U.S.A.
14 Bellingshausen U.S.S.R.

ANTARCTICA

0 500 1000 Miles
0 500 1000 Kilometres

ABBREVIATIONS:

ARG. ARGENTINA
AUST. AUSTRALIA
N.Z. NEW ZEALAND
S.A. SOUTH AFRICA
U.K. UNITED KINGDOM
U.S.A. UNITED STATES OF AMERICA
U.S.S.R. UNION OF SOVIET SOCIALIST REPUBLICS

"ANTARCTIC"

(Successor to "Antarctic News Bulletin")

Vol. 7, No. 8 **80th ISSUE** **December, 1975**

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CONTENTS

Nine men at Cape Adare celebrated Christmas in Antarctica a long time ago. Of Christmas Day, 1899, at Camp Ridley, Borchgrevink wrote: "On Christmas Day we had tinned plum-pudding, and Mr Evans, in honour of the occasion, baked cakes; and Mr Ellefsen even surpassed himself in the excellence of his cooking."

Borchgrevink's successors, 76 years later, will also celebrate their Antarctic Christmas in traditional fashion. But they are better off than the lonely men of Cape Adare. Radio and air transport have brought them closer to their homes and each other. Once again "Antarctic" wishes them all a Merry Christmas.

N.Z. PROGRAMME CUT ABOUT ONE-THIRD

New Zealand's Antarctic research programme for 1975-76 has been reduced by about one-third only a month after the official start of the summer season because of an accident to a United States Navy Hercules at Dome C in Wilkes Land on November 4. This left the support force with only two ski-equipped Hercules aircraft for flights to inland stations, and the return of men at the end of the season.

As a result the Antarctic Division, Department of Scientific and Industrial Research, has had to cancel some projects, reduce the numbers going south later in the season, and shorten the time allowed for work by parties already in the field.

Last month 68 scientists and others were listed to go south. Now only 27 New Zealanders will take part in the latter half of the planned programme. Events which have been cancelled include the Leda project, a joint United States-New Zealand upper atmosphere programme at Siple Station, the work of the New Zealand Antarctic Society's caretakers at the historic huts on Ross Island, and visits by representa- Committee and the University Grants Committee.

This season the Royal New Zealand tives of the Ross Dependency Research Air Force is making seven flights to the Antarctic—the first at the end of last month—in support of the United States and New Zealand programmes. But its Hercules aircraft are not ski-equipped, and their operations are limited by the time the annual ice runway in McMurdo Sound remains in use. After the ice goes out later this month operations are confined to the Williams Field skiway on the Ross Ice Shelf.

TEAM RELIEVED

A new Antarctic research programme began officially on October 10 when the first contingent arrived to relieve the winter team of 11 men at Scott Base, and to initiate a wide range of scientific projects. The contingent included 11 members of the drilling team to work on the main event of the programme—the conclusion of the international Dry Valley Drilling Project—which involves drilling into the seabed of McMurdo Sound from a platform on the sea ice.

Winds gusting to 70km an hour and poor visibility delayed the reopening of Vanda Station, 130km west of Scott Base, in the Wright Valley, which is New Zealand's only continental base. But on October 21 United States Navy helicopters flew in the four men who will operate the station during the summer, and more than four tons of equipment. Vanda Station, which was closed last winter, is a staging post for field parties working in the dry valley region

By last month the first part of the programme was in full swing. The drillers were at work in McMurdo Sound on a site 70km north-west of Scott Base, and five geological expeditions were in the field. Four were working in the dry valley region, which includes the Taylor, Wright, and Victoria Valleys.

FIRST IN FIELD

First in the field was an expedition to map the geological history of a little-explored region of the Trans-Antarctic Mountains south-west of Scott Base. Dr D. N. B. Skinner and Mr B. C. Waterhouse, of the New Zealand Geological Survey, and two field assistants, Messrs G. G. Brehaut and K. R. Sullivan, were flown to the Skelton-Koettlitz Glaciers region by a United States Navy helicopter. Four flights were needed to carry the party and its gear to the base camp in the Cocks Glacier, which feeds into the Skelton Glacier about 160km from Scott Base. The Skelton and Koettlitz Glaciers both empty into the Ross Ice Shelf, and are surrounded by peaks of up to 3700m in height.

Originally the Geological Survey planned to send a party into the Terra Nova Bay region, about 400km north of Scott Base. This plan was dropped because no support by Hercules aircraft was available this season.

Two other geological parties began field work towards the end of last month. The Waikato University expedition is studying glacial moraines, fluvial deposits, and rock formation in relation to melt-water streams and lakes in the dry valleys. Originally Dr T. Healy was to lead a party of six for six weeks in the field. Now he is accompanied only by Dr J. Shaw, and they will remain for only four weeks.

Drs Healy and Shaw were flown first to the Lower Wright Valley 130km north-west of Scott Base. They will study first the bed formation of Antarctica's only real river—the Onyx—which in summer flows 30km into Lake Vanda from the Lower Wright Glacier. Later they will visit the Taylor and Victoria Valleys, the Koettlitz Glacier and Black Island.

GLACIAL MORAINES

Four members of the Victoria University of Wellington expedition also began work in the Taylor Valley last month. Mr P. Robinson, the leader, Dr J. Collen, and Messrs A. Palmer and A. Eggers, went first to Cape Barne, 36km north of Scott Base. Then they flew to the Taylor Valley to map and sample ancient glacial moraines.

Two women geologists, Dr Susan West and Mrs Margaret Bradshaw, began the collection of rock and fossil specimens in the dry valleys for the Canterbury Museum's Antarctic centre. They flew first to Lake Bonney in the Taylor Valley with two field assistants, Messrs M. Wenden and B. Chalmers.

Because of the demands on aircraft the University of Canterbury's expedition to Cape Bird has been reduced from five to two. The leader, Dr D. S. Horning, who is an American zoologist, and Mr P. Sagar, flew south at the end of last month to work from the field station which has been occupied by the university's biological unit for 10 years.

FIFTH SEASON

Dr Horning, who is making his second trip south, will concentrate on a study of a tiny land insect, the springtail. Mr Sagar, who will be working at Cape Bird for his fifth season, will study shallow water marine life, and how communities adapt to coastal dynamics—sea, wind, and ice action.

Early this month a geochemist and a geologist resumed their vulcanological studies of Mount Erebus, one of Antarctica's two known active volcanoes. Dr W. F. Giggenbach, of the Chemistry Division, D.S.I.R., and Mr P. R. Kyle, of the Victoria University of Wellington, were members of the New Zealand-French-American expedition which attempted last summer to sample the unique lava lake of the volcano's inner crater.

This year's party, which is led by Mr C. C. Monteath, an Antarctic Division field officer, will observe the lake from the outer crater. Because working near the summit of the 4000m mountain can cause altitude sickness, the party plans to acclimatise on the summit of Mount Terror (3230m), an extinct volcano, and Ross Island's second highest peak.

One of the annual events in the New Zealand programme is the census of Weddell seals and Adelie penguins in the south-west area of McMurdo Sound. The first count was made in October by the new season's counter, Mr C. Chapman, who is also the dog handler. On a United States Navy helicopter flight to Cape Royds, 40km north of Scott Base, he counted 224 seals, including the season's first pup. During the summer Mr Chapman will make five more counts of the seal population. Scott Base staff will also make a count of the Adelie penguins in the Cape Royds rockery.

Since 1969-70 lake and river levels, and glacier movements, in the dry val-

leys have been measured by teams from the Water and Soil Division of the Ministry of Works and Development. This summer another party led by an hydrologist and glaciologist, Mr T. Chinn, is working from Vanda Station. The other members are Messrs P. Mason and G. Craig.

Mr Chinn expects to find that, as in past year, lake levels are rising in tune with the increasing average temperature. The McMurdo Sound area has warmed by about two degrees Celsius since records were first taken 18 years ago. And Lake Bonney in the Taylor Valley has been rising for more than 60 years since it was first measured by Captain Scott during his 1901-1904 expedition.

Because of the reduction of the New Zealand programme several women are not going south this season. One who went earlier was Miss Edith Farkas, of the New Zealand Meteorological Service's research section. She spent several weeks at Scott Base monitoring the surface concentrations of ozone.

The Scott Base monitoring project was designed to offer a basis for comparison of ozone levels in New Zealand cities with those in Antarctica. Ozone, which is found in trace quantities on the earth's surface, moves down from the upper atmosphere, and usually is destroyed on contact with solid surfaces. But in certain conditions concentrations of the gas can be trapped in cities polluted by factory fumes and car exhaust gases.

RARE SCOTT BASE VISITORS

Scott Base had two rare visitors early last winter. A pair of elephant seals, each weighing about 1800kg, disrupted normal operations, and for several days the winter team was unable to burn rubbish in the nearby incinerator. Normally the southern elephant seal (Mirounga leonina) inhabits sub-Antarctic and Antarctic islands north of the pack ice. Very occasionally it can be found in the pack ice.

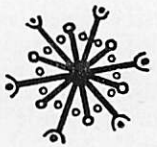
Mr J. A. Newman, last season's leader, who returned to his home in Auckland early in October after 12 months in the Antarctic, explained in Christchurch that the two seals—both about 3 metres long—hung around the base for about a month. "We were led to believe that they were the first elephant seals seen so close to Scott Base for a long time," he said. "At one stage they camped near the incinerator so we were unable to use it.

"During the time they were around the base they upset the daily routine. After all, they are not the sort of creatures to play with. We all treated them with great caution. On one occasion the pair, both males, had a fight outside the base.

"There was nothing we could do. They were simply too big for us to deal with. The outcome of the fight was that one of them received a damaged eye and, beaten, it went away.

Mr Newman whose New Zealand flag was formally lowered on October 10 when he handed over to the new leader, Flight Lieutenant H. D. Raynham, said that the winter at Scott Base had been particularly severe this year. Temperatures dropped to minus 56.1deg Celsius—just 0.9deg from an all-time low. But there had been few problems, and the scientific programme was most successful. Morale among the 11 men of the winter team was good, and their health was excellent.

Mr Newman had kind words for the dogs at Scott Base. Not only did they have recreational value for the men but also the large litter of puppies born during the year was fussed over by men who had no other companions except their colleagues.



Gas and cracks in ice stop McMurdo Sound drilling

Cracks in the annual sea ice round the drilling rig, the presence of gas containing 38 per cent methane, and an increase in temperature, ended the first attempt to drill into the seabed of McMurdo Sound from a drilling platform on the ice. This operation was the final stage of the Dry Valley Drilling Project, a three-year programme developed by scientific organisations of the United States, Japan, and New Zealand.

Drilling began on November 7 after the drill rig and a camp for 20 drillers and scientists had been established at Site 1A (see map) 70km north-west of Scott Base. The rig was on sea ice 1.8m thick, and above 120m of water. After two weeks drilling round the clock the operation was stopped on November 21 because of a combination of potentially unsafe conditions.

By that date the drilling team of 15 New Zealand drillers had drilled to a depth of 69.625m through the seabed sediment. Drilling was stopped when a team of American, New Zealand, and Japanese geologists and geochemists discovered 38 per cent of methane in gas obtained from some unconsolidated core. The methane was detected at 68m below sea level. There was also an increase in temperature and the temperature gradient.

These gas and temperature factors indicated that further penetration could threaten the safety of the drill team. Because of technical and logistic problems blow-out preventers could not be fitted to the drill rig.

Other factors which were taken into account included the development of radial, and a few annular, cracks in the sea ice near the drill site and the development of some large working cracks in the annual ice, starting at Marble Point, and at Cape Bernacchi. These large cracks were traced to within five miles of the site before they passed into open water.

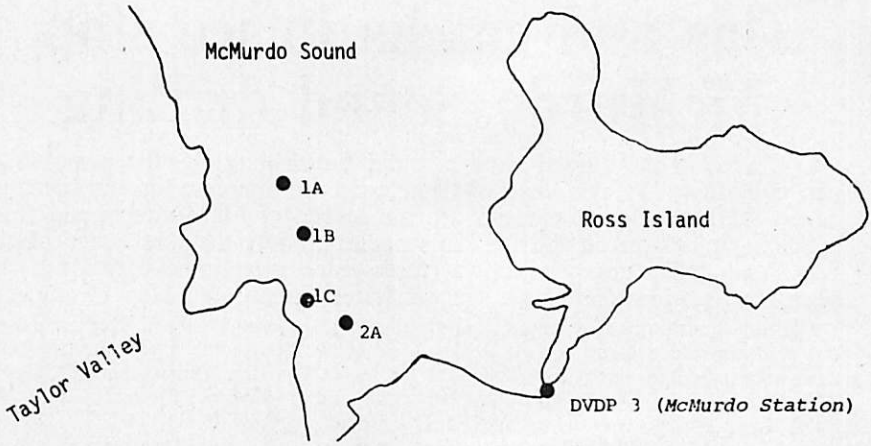
Dr Samuel B. Treves, project manager for the operation, who is professor of geology at the University of Nebraska, Lincoln, made the decision to cease drilling. The New Zealand drilling superintendent, Mr J. E. Hoffman, who is senior technicial officer in the Geophysics Division, Department of Scientific and Industrial Research, and the project geologist, Dr P. J. Barrett, director of the Antarctic Research Centre, Victoria University of Wellington, concurred in the decision.

In its fifth season, the Dry Valley Drilling Project was designed to obtain a better understanding of the Cenozoic geological history of the McMurdo Sound area. Since the project began, New Zealand has been responsible for all drilling. Last season the seabed programme—the last stage of the project—had to be postponed because winter storms and high tides in McMurdo Sound broke up the ice, leaving no drilling platform.

Drilling at 14 earlier sites has yielded cores from the ice-free dry valleys of Southern Victoria Land, and on Ross Island. From the site 1A drilling has come new information on the McMurdo Sound sub-surface geology, bottom fauna, bathymetry, and the characteristics and behaviour of annual ice.

Geologists expected that traces of gas would be encountered during the McMurdo Sound drilling, but not significant amounts. Japanese scientists installed at the site a methanameter for early detection of methane, and a gas chromatograph which could measure both methane and ethane.

But the drilling superintendent, Mr Hoffman, who has been in charge of all previous drilling operations, said last month that the team did not expect to strike gas so early. Also it had been expected that the McMurdo Sound ice



Site 1A in McMurdo Sound at latitude 77 deg 27 min 40 sec S is the site chosen for the final phase of the Dry Valley Drilling Project.

would stay intact until the middle of this month.

After the evacuation of the site was ordered the drill rig was dismantled, and essential components and camp equipment were returned to McMurdo Station by United States Navy helicopters. Thirty flights were made to bring back the men and their equipment. Some equipment was hauled by sledge to Marble Point, 30km east of the site, for storage there, and at New Harbour.

Unpredictable tidal fluctuations in McMurdo Sound hampered the drilling from the outset, according to Mr Hoffman. The fluctuation was as much as 1.5m in a day, whereas only 55cm had been predicted. There was also a slight problem from swells with the rig riding over 120m of water.

Before drilling began early last month installation of the drilling rig was hampered by rapid up and down movements of the ice. When the drilling bit had penetrated 7m into the seabed work round the clock was stopped because of a southerly gale of up to 50 knots.

On November 11 the site had to be evacuated because of a storm warning of winds up to 70 knots which might weaken the ice and cause it to break out. The 15 drillers and United States and Japanese scientists working on the project were flown back to McMurdo Station by United States Navy helicopters.

Early in October a joint American-New Zealand survey of the seasonal ice showed that it was thick enough for the drilling project. A party, which included Dr S. B. Treves, of the University of Nebraska, who is the DVDP co-ordinator, and Mr J. A. Newman, leader at Scott Base last season, inspected some "dirty" ice about 30 kilometres from Scott Base, and established that a road to the drilling site could be built on it.

Two tractor trains and a United States Navy helicopter were used to establish the drilling camp in the last two weeks of October. The first tractor train took six drillers and camp materials to the site, and two were with the main tractor train which left Scott Base on October 29. The rest flew to the site on October 30.

Flights by American Starlifters begin new research season

United States scientific research in the Antarctic this season will cost $30.7m. This figure is slightly more than the allocation for the 1974-75 season, but rising fuel costs and inflation have effectively reduced the amount of money to be spent. The size and scope of the research programme have been limited in some areas because of lack of funds, and the reduced number of aircraft available for logistic support.

This season the summer airlift of scientists, servicemen, and supplies by Starlifters of the United States Air Force Military Airlift Command was not delayed unduly by bad weather in the Antarctic. Storms near McMurdo Station on October 20 delayed the departure of two United States Navy Hercules aircraft, but last month the Starlifter supply flights were made without interruption.

A new season of scientific research began on October 10 when two Starlifters flew from Christchurch to McMurdo Station with 176 passengers, and mail and fresh food for the men who had been there all winter. One aircraft carried 82 passengers and about 4400lb of cargo, mainly letter mail—the first since the Winfly flights in September. The other took 94 passengers only.

More than eight months isolation for 17 scientists and civilians at the Amundsen-Scott South Pole Station ended on October 25 when a Hercules made this first flight of the season from McMurdo Station. The aircraft brought a cargo of fresh vegetables and mail—the first the men had received since they settled in for the winter on February 13.

ALMOST A YEAR

One man had been at the Pole for almost a year. He was the station leader, Mr Richard Wolak, who relieved Lieutenant Robert Braddock in November last year when the new geodesic dome complex was transferred to the operational control of civilian contractors for the National Science Foundation. Since 1957 the station had been operated by the United States Navy.

Mr Wolak and his men were the first completely civilian team to winter at the Pole Station. They were also the first to occupy the new station, which was dedicated in January this year.

Commander F. C. Holt, commanding officer of the Navy's VXE Squadron, made the first flight. Passengers in the aircraft were Captain E. W. Van Reeth, the support force commander, Mr D. Bresnahan, of the National Science Foundation, and Mr E. Herbst, representative for the civilian contractors, Holmes and Narver.

VIRUS RESEARCH

Also on the flight was Dr H. G. Muchmore, of the Oklahoma Medical Research Foundation. He arrived to continue his annual studies of immunilogical changes in men who winter at the Pole Station. His purpose is to isolate and identify the respiratory virus which causes infections after the men return from the Antarctic.

Dr Muchmore's assistants arrived on the second flight to the Pole. They included his wife, Mrs Donna Muchmore, and Miss Nan Scott, who worked at the station last summer.

Christmas gifts

One again New Zealanders at Scott Base and Vanda Station, and those working in the field, will have homemade biscuits and fruit cake for Christmas. Early this month 83½ dozen bissuits and 10 fruit cakes were flown from Christchurch to the Antarctic.

Members of the Canterbury branch of the New Zealand Antarctic Society are responsible for the Christmas gifts.

Three damaged aircraft in East Antarctica

Dome C, an ice dome in East Antarctica, 1150km from McMurdo Station, has become a place of ill omen in United States Antarctic operations this year. Two ski-equipped Hercules aircraft damaged in take-off accidents have remained abandoned there since January 15. A major project to recover one of the aircraft this season was abandoned temporarily after a third Hercules was damaged on November 4.

After acclimatisation again at the Amundsen-Scott South Pole Station the recovery party returned to Dome C on December 7. It will resume preparation of the skiway started last month.

Last season's involvement in the International Antarctic Glaciological Project in East Antarctica has proved costly to the National Science Foundation and the United States Navy's support force. Research programmes which required the use of Hercules aircraft to establish field camps or deliver supplies have been cancelled, and the Navy has been left with only two aircraft to supply inland stations, and bring back scientists and support staff at the end of the season.

Because of lack of funds and the shortage of aircraft after the accidents in January, the Ross Ice Shelf drilling project was postponed for this season. The accident to the third Hercules also caused the cancellation of a geophysical and geological survey on the ice shelf because it would have involved open field landings by the two remaining aircraft.

This season 25 flights will be made to the Amundsen-Scott South Pole Station instead of 47. Siple Station, the most isolated station at the base of the Sentinel Mountains in Ellsworth, which is 2173km from McMurdo Station, may not be used next winter. Flights will be made this season to take in a larger party which will prepare the station for the winter, and to bring everyone back before summer operations end.

When the new season started an advance party was flown to Dome C to build a skiway as a preliminary to the establishment of a recovery camp where a team of 50 men could repair the two aircraft damaged in January so they could be flown to McMurdo Station, and later to Christchurch and the United States. The cost of recovering the two aircraft worth about $18m was estimated at $2 to $3m.

Last month priority was given to the recovery of the third aircraft damaged on November 4. But later it was decided that rather than jeopardise the two remaining aircraft the resupply flights to the Pole and Siple Stations should be completed first.

After this programme is completed an attempt will be made to bring back the third Hercules to McMurdo Station. The success of the operation will depend on the weather at Dome C where temperatures on the ice-cap at 3300m above sea level can drop as low as minus 50deg Celsius, and whether there is sufficient time before the season ends.

Air support of glaciological research in East Antarctica ended last season with the damage of the two Hercules aircraft at Dome C. One flew there to pick up a field party of French, American, and Russian scientists. During take-off a jato (jet assisted take-off) bottle exploded, damaging the fuselage and starting a fire in one engine.

Another Hercules landed and picked up the five passengers and five crew members. It took off without using jato bottles, but the nose ski collapsed during the long take-off from the ice-cap. A third Hercules returned the passengers and crews to McMurdo Station without incident several hours later.

Plans were made at the beginning of this season to establish the field camp at Dome C, and fly in the recovery team and equipment to repair the two aircraft, which are about one mile apart. Fifteen men selected to prepare a landing strip were given snowcraft and survival training by New Zealand instructors at Scott Base, and then spent several days at the Pole Station, which is at an altitude of 2800m, to become acclimatised to working in the rarefied atmosphere at Dome C.

After an aerial reconnaissance on October 22 a Hercules flew to Dome C on October 29, landing and taking off without incident. A small party of scientists and naval officers spent three hours in a temperature of minus 32deg Celsius, inspecting the damaged aircraft, and checking sites for construction of an access skiway.

THIRD ACCIDENT

On October 31 the advance party was flown from the Pole Station to begin work on the skiway so materials and machinery could be flown in from McMurdo Station. But four days later a Hercules which had just delivered cargo to the site was damaged on take-off in the same way as the first aircraft on January 15. A jato bottle broke loose, and hit a propeller. Metal "shrapnel" damaged an engine, and punched holes in the fuselage.

Work on the site, including preparation of the skiway, continued in temperatures between minus 17deg and minus 55deg Celsius until the decision to postpone recovery of the third aircraft was made. Then on November 17 the advance party was flown back to McMurdo Station. The aircraft, which did not use jato bottles, took off on the second attempt.

McMURDO SOUND DEATH

An American biologist died in McMurdo Sound early in October when a tracked vehicle broke through the annual ice and sank in about 1500ft of water. Three other scientists in the vehicle escaped before the vehicle sank near the Erebus Ice Tongue about 10 miles from McMurdo Station.

The man who died was Mr Jeffrey D. Rude, aged 26, single, of La Jolla, California. Those who escaped were Messrs D. P. DeMaster and R. Huempfner, of the University of Minnesota, and Mr D. Watson, of the Scripps Institution of Oceanography, University of California, San Diego.

Messrs Rude and Watson were members of a field team which flew south early in September to continue last season's studies of benthic communities in McMurdo Sound. Messrs DeMaster and Huempfner were also on the early flights to continue studies of the seal population in the Ross Island area.

On October 12 the four men left McMurdo Station about 8 a.m. to make a survey of the ice before fish huts were placed in position for their studies. Earlier the ice had been estimated to be between 3ft and 5ft thick, but it gave way, and Mr Rude, who was driving the vehicle, was trapped in the cab.

The accident happened about 10.30 a.m. but was not reported until 2.30 p.m. because the three survivors had to walk 10 miles back to McMurdo Station.

ANTARCTIC BOOKSHELF

POLAR AND COLD REGIONS LIBRARY RESOURCES: A DIRECTORY COMPILED AND EDITED BY NORA T. CORLEY, OTTAWA, NORTHERN LIBRARIES COLLOQUY, 1975. 1v. (unpaged).

This directory was published in May, 1975, by the Northern Libraries Colloquy. It lists 153 libraries (in 20 different countries) whose collections deal with the Arctic, the Antarctic and/or cold regions research. Some of the libraries are actually situated in the north.

Complete names, addresses, telephone and telex numbers are given, as well as a short history and description of the libraries and their resources. Entries run from a few lines to several pages, depending on the size of the library. Three indexes are included: (1) name of library, including translations, acronyms and former names; (2) personal names; and (3) subject.

The directory, compiled and edited by Nora T. Corley, for many years librarian of the Arctic Institute of North America in Montreal, Canada, is available from: Polar Libraries Directory, c/o Mrs G. A. Cooke, librarian, Boreal Institute for Northern Studies, University of Alberta, Edmonton, Alberta, Canada, at a cost of $5.00 Canadian, including handling and postage (book rate).

If first-class or air mail is requested, there will be an extra charge for the postage. Cheques, money orders, etc., should be made payable to Polar Libraries Directory, c/o Mrs G. A. Cooke.

Because Ferguson farm tractors went out of production many years ago, it is difficult to obtain spare parts to restore the Pole vehicle. Messrs Smith and Norris have found that they need 38 links for the tracks. They hope more links for the tracks.

For 13 years after the crossing snocat Able was used by New Zealanders at Scott Base. In 1971 Mr R. B. Thomson, superintendent of the Antarctic Division, Department of Scientific and Industrial Research, arranged for it to be brought to New Zealand in H.M.N.Z.S. Endeavour, the Antarctic supply ship.

After 12 months of seeing only ice and snow Mr Newman looked forward to the joy of standing on a beach and getting warm in the sun. When he flew back to Christchurch some friends were waiting at the airport with the beginnings of a beach—a small box of sand with green grass and a "tree".

During the winter months the men spent much of their spare time reading or making models. Painting was among the hobbies, and the model makers produced several cannons, and a steam engine. The dog handler, John Stevens, made a scale model of a dog sledge. the winter in good health although some suffered with frost-bitten paws when temperatures were low.

"The scene is wholly enchanting, and such a view from some sheltered sunny corner in a garden which blazes with masses of red and gold flowers tends to feelings of inexpressible satisfaction with all things."

A small stone shelter still stands at the bottom of the garden. It was built at the edge of the cliff by Sir Joseph Kinsey so Mrs Scott could observe the birds rising in the updrafts against the cliffs along the edge of the property.

U.S. SCIENCE PROJECTS THIS SUMMER

Geological studies directed towards an evaluation of the Antarctic Peninsula area for petroleum and natural gas, are among the projects of the United States Antarctic Research Programme this season. Another study of the development of the Antarctic Peninsula and the Scotia Arc is being made to evaluate this region eventually as a source of minerals, especially copper. Before the season ends scientists financed by the National Science Foundation will have completed projects at the South Pole, on Ross Island, in the Ross, Scotia and Weddell Seas, and in the Indian Ocean.

This season several projects have been cancelled or completed earlier because of an accident to a United States Navy Hercules in Wilkes Land early last month. But scientists from more than 25 universities and scientific organisations, the National Aeronautics and Space Administration, and the National Oceanic and Atmospheric Administration, are engaged this summer on a wide range of projects related to atmospheric and earth sciences, glaciology, oceanography, meteorology, and the study of bird and marine life.

Several projects in the programme are being carried out in co-operation with scientists of other nations. United States scientists are associated with those of Britain, Japan, the Soviet Union, New Zealand, Australia, Argentine, Chile, Canada and Brazil. They will work with French scientists aboard the Marion Dufresne on her biological survey cruise in the Indian Ocean, and the British Antarctic Survey's Royal Research Ship Bransfield will transport most of the resupply cargo for Palmer Station, on Anvers Island, off the Antarctic Peninsula.

EARLIER STUDY

Geological investigations on Seymour Island, about 100km south-east of the Antarctic Peninsula, will be conducted by a team from Ohio State University, led by Dr David H. Elliot, of the Institute of Polar Studies. Its objective will be to determine the geology, stratigraphy, and palaeontology of the exposed, raised continental shelf sediments in the Antarctic Peninsula, Scotia Arc, and far southern South America. The ultimate utility is towards an evaluation of the Antarctic Peninsular area for petroleum and natural gas.

Last season four geologists from the Institute of Polar Studies, and Northern Illinois University, led by Dr Elliot, were invited by the Argentine Antarctic Institute to take part in its field project on Seymour Island. This season Dr Elliot's team will be flown to the island by the Argentine Air Force.

A related project with one of its ultimate objectives the evalulation of the Antarctic Peninsula and the Scotia Arc as a source of minerals, especially copper, will be carried out by a geological team from the Lamont-Doherty Geological Observatory, Columbia University, led by Dr I. W. D. Dalziel. This team will work in the Antarctic Peninsula area from the research vessel Hero.

MARINE RESOURCES

The object of the study is to determine the structure and tectonic history

of the Antarctic Peninsula(Scotia Arc, and far southern South America. This is part of the Scotia Arc-Antarctic Peninsula Tectonics Project. Its purpose is to obtain an understanding of the past interrelationships of Antarctica with the adjacent continents and ocean basins.

A third team from the University of Wisconsin, which will include a Chilean geologist, will work from Tierra del Fuego to study various sites on the Antarctic Penisula. The objective of the team, led by Dr R. H. Dott, of the department of geology and geophysics, is to investigate Cretaceous conglemerates to provide evidence about the beginnings of the upheaval of the Andes Mountains.

Marine resources of commercial interest will also be studied in the Antarctic Peninsula area. A team led by Dr M. A. McWhinnie, of the department of biological sciences, DePaul University, will study the biology and population dynamics of Erphausia superba, the predominant species of krill in the Bransfield Strait and the Scotia Sea. The team will operate from the research vessel Hero, and collect krill samples. Further studies on metabolic pathways will be undertaken with krill, and other pelagic and selected benthic invertebrates colected near Palmer Station.

OZONE SHIELD

Present scientific concern at the effect of trace gases on the earth's protective ozone shield in the stratophere is reflected in the nature of atmospheric science studies which will be made at the Amundsen-Scott South Pole Station and McMurdo Station this season. Current theories indicate that these trace gases, especially chloroflurocarbons, may be depleting the ozone shield.

Enriched concentrations of halocarbons and other trace gases in snow will be measured at the South Pole by of civil and environmental engineering, Washington State University, and Mr E. Robinson. This is to help establish a polar halocarbon concentration profile. Types of halocarbons present, which are being removed, and the rate of removal, also will be determined. A primary question related to this research is how the polar atmosphere removes trace gases, especially chloroflurocarbons, from the global atmosphere.

CLIMATE CHANGES

Geophysical monitoring for climatic change will be continued at the Pole Station which is one of the six planned clean air monitoring observatories of the National Oceanic and Atmospheric Administration. The purpose is to determine background levels of trace gases and aerosol particles in the atmosphere, to record their rate of change, and to assess the effects they may have on climate.

Measurements will be made of carbon dioxide levels to determine the rate of increase from combustion of fossil fuels, biotic uptake etc., surface and total ozone to study short-term variations in climate as reflected in year to year shifts in the concentrations of these gases, and of aerosols to establish baseline values for turbidity and global pollution.

An aerosol chemistry sampling programme will be continued at the Pole Station by a team led by Dr W. Zoller, of the department of chemistry, University of Maryland. Atmospheric ice crystals and bulk particulate matter will be collected and analysed. These will be compared with surface ice and snow samples to evaluate the importance of the polar ice cap as a thermal trap for particulate and gaseous materials.

GAS SAMPLING

Four balloon-borne soundings to measure aerosol particles and gas samples in the polar stratosphere will be

made next month from McMurdo and Amundsen-Scott South Pole Stations. Gas samples will be retrieved from two flights at McMurdo Station and particles will be counted in two flights at the South Pole.

After recovery the gas samples will be analysed by the National Oceanic and Atmospheric Administration. These measurements are aimed at studying how chlorine atoms may possibly reduce earth's stratispheric ozone shield by catalytic destruction of ozone molecules. The leader of the field team for the study is Dr D. J. Hoffman, of the department of physics and astronomy, University of Wyoming.

A command and data acquisition facility will operate at the South Pole Station this summer and next winter for the National Aeronautics and Space Administration's dual air density twin satellite experiment. Two Explorer satellites launched late this year are expected to remain in about the same orbit throughout their two-year mission.

Each satellite uses a mass spectrometer as part of a unique system that is insensitive to orientation, highly sensitive to the upper atmosphere, and capable of calibration in flight. Comparison of measurements from the two satellites should reveal the atmosphere's vertical structure on a global scale from altitudes of 350 to 1500km.

ICE MOVEMENTS

Doppler research will continue at the Amundsen-Scott South Pole Station by the United States Geological Survey to obtain data on ionespheric and tropospheric effects of radio propagation, ice sheet movements, and polar motion and the earth's spin axis. Satallite tracking facilities at the Pole and McMurdo Station will serve as master translocators for geoceivers.

This season geoceivers will be used to establish accurate positions of study sites that were established on the Ross Ice Shelf during the 1974-75 field season. Geoceivers will be used also in a cooperative programme with the British Antarctic Survey to establish accurate controls for positioning satellite imagery of the Ellsworth Mountains.

During next winter two members of the Geological Survey team will operate telemetry equipment for the N.A.S.A. dual air density Explorer satellite programme. They will also assist in a seismological monitoring programme of the survey's office of Earthquake Studies.

Atmospheric processes and energy transfers will be studied at the Pole by a team from the University of California, Davis. The primary objective is to determine the energy balance of the Antarctic and its effect on large-scale atmospheric circulation in the Southern Hemisphere. Data obtained is expected to help to an understanding of global weather and climate.

COSMIC RAYS

Scientists at McMurdo Station are engaged in continuing studies of seals, penguins, marine life, and Antarctic fishes. In addition the cosmic ray intensity measurements which have been made by the Bartel Foundation for several seasons will be continued with the aid of a new 10-tonne cosmic ray detector which has statistic precision exceeding that of any on earth.

This cosmic ray detector has been shipped to McMurdo Station, and next winter it will be operated in a test mode. In the 1976-77 season it will be installed at the Pole Station just before the maximum period of the present sunspot cycle when events of special interest, particularly the production of solar cosmic rays, will occur in profusion.

Antarctic fishes survive in the icy waters of McMurdo Sound because their body fluids are fortified with glycoproteins that possess anti-freeze pro-

perties. These anti-freezes have been studied for several seasons by Dr A. L. DeVries and other scientists from the physiological research laboratory of the Scripps Institution of Oceanography.

FISH SURVIVAL

This season the scientists will study how these anti-freezes protect the various fishes of McMurdo Sound. Glycoproteins will be purified from blood samples taken from the large Antarctic cod (Dissostichus mawsoni). To determine how and where these glycoproteins are synthesised, and how they prevent ice from propagating across the body wall, the black cod notothenia angustata will be transfused with anti-freeze, and the effect on its survival will be studied.

This black cod, which belongs to the Antarctic cod family, is one of the few members that lacks anti-freeze compounds. For comparative purposes black cod will be collected from the United States Coast Guard icebreaker Burton Island in the area of Scott Island and the Balleny Islands. This is the only place where the fish can be found.

SEAL CENSUS

For the last five years scientists from the University of Minnesota have conducted a census and tagging of Antarctic seals in the Ross Island area. This season studies of the status and population dynamics will be conducted at Hutton Cliffs, and at a remote colony about 8km off the coast. Weekly census trips will be made by helicopter to the Dellbridge Islands.

Earlier in the season another University of Minnesota team studied the breeding behaviour, activity and distribution patterns of leopard and crabeater seals in unconsolidated pace ice near Palmer Station. The team worked from the research vessel Here, and used radio frequency tags to track seals through the pack ice.

A study of the population biology of Adelie penguins, started at Cape Crozier by the banding of 5000 chicks annually from 1961-1962 to 1969-1970, is nearing completion. This season a team from the Point Reyes Bird Observatory, Bolinas, California, is studying the oldest birds — those nine to 14 years of age — to find out the incidence of breeding, and what the mortality was among old birds last winter.

DRY VALLEYS

Geothermal studies in the dry valleys of southern Victoria Land will be made by geologists from the University of Wyoming. Subsurface temperatures will be measured in holes drilled in past seasons by the Dry Valley Drilling Project. Other field work will include the collection of core samples for radioactivity measurements (uranium, thorium and potassium), and the thermal properties of the rocks penetrated.

These studies will provide new data on permafrost thickness, recent climate changes, heat flow, and very deep subsurface temperatures near McMurdo Station and the dry valleys. More knowledge of these phenomena may lead to thermal explanations for glaciation and other aspects (young volicanims and uplift) of this portion of Antarctica's geogolic history.

Hydro-geological investigations made during the last two summers will be continued this season in the Wright and Taylor Valleys by a team from the Illinois State Geological Survey. Particular emphasis will be placed on studying groundwater above frozen ground, and detailed investigations will be made in the Wright Valley from Lake Vanda west to the Labyrinth. Information obtained should lead to an understanding of the mass balance and chemical characteristics of lake, pond and soil waters.

GLACIAL ICE

Scientists from the University of Maine will continue their studies of the late Cenozoic glacial history of East Antarctic, working in the dry valleys and the McMurdo Sound area, and at Cape Crozier. Field work since 1957 suggests that the Ross Sea, and probably the Weddell Sea, were filled to a large

extent with grounded glacial ice at the maximum of the last glaciation.

This sheet represented an extension of west Antarctic ice, fed also by outlet glaciers from East Antarctica, onto adjacent continental shelves. Carbon-14 dates indicate that ice recession began earlier than 10,000 years ago, and has continued even through the last several thousand years.

Because of speculation about the possibility of continued recession and concordant changes in sea level, the scientists will obtain cardon-14 dates on raised marine sediments in the McMurdo Sound region, map glacial deposits in the Ferrar Valley and elsewhere in the region, and examine nunataks behind the Taylor and Wright Valleys.

PISTON CORING

This project is linked with another in which a second University of Maine team will do piston coring from the United States Coast Guard icebreaker Glacier for a quantitative palaeoclimatic analysis of Ross Sea continental shelf sediments.

Recent studies of the Ross Sea in West Antarctica have produced evidence suggesting that the Ross Ice Sheet is inherently unstable. To test this and other hypotheses, a study of the dynamic history of the Ross Ice Sheet will be made by sedimentological and micropalaeontological analyses of core material from the Ross Sea, the Ross Ice Shelf, and the dry valley and deep sea drilling projects.

It is hoped that this study will: (1) determine chronology, duration and extent of past fluctuations of the Ross Ice Sheet shelf system; (2) provide a stratigraphic link between sediments of the sub-Antarctic Southern Ocean and the glacial stratigraphy of the Trans-Antarctic Mountains; (3) determine the relationship between documented glacial events in the Antarctic, and climatic events documented for the rest of the world.

WEDDELL SEA

After the piston coring project is completed the Glacier will proceed to the Weddell Sea with scientists from the Scripps Institution of Oceonography. As a continuation of the International Weddell Sea Oceanographic Expedition, a physical oceanographic investigation of the west Weddell Sea will be carried out. Continuous measurements of salinity, temperature, and depth will be made, and at the edge of the pack ice in the northern Weddell Sea three current meters stored there in February this year will be retrieved. This work is to further understanding of the formation of Antarctic bottom water.

Most southerly voters

New Zealand's most southerly voters in last month's General Election were Messrs B. V. Maguire and R. D. Stainer, two meteorologists at the Amundsen-Scott South Pole Station. More than 800 miles to the north the leader at Scott Base, Flight Lieutenant H. D. Raynham, made a 10-hour trip by helicopter to collect votes from New Zealanders in the field.

As returning officer Flight Lieutenant Raynham flew out to the drilling party on the sea ice in McMurdo Sound, and to Vanda Station in the Wright Valley. Near the Cocks Glacier, about 128km from Scott Base four New Zealanders voted at a specially-rigged booth with a New Zealand flag flying from an ice axe.

About 85 men and women in the field and at Scott Base cast their special votes, which were sent by mail to New Zealand. One man, 24-year-old Allan Dawrant, who is the base Post Office technician, voted for the second time in his life, and again in the Antarctic.

Mr Dawrant voted at Scott Base in the 1972 General Election when he became eligible at 21. He wintered there in 1973, and will have a second winter next year.

These three women are the first to be included in an Australian expedition to the Antarctic Continent. From left they are: Juta Hosel, Shelagh Robinson, and Elizabeth Chipman. They will sail south to Casey early next month.

Nella Dan begins relief of Australian stations

Relief of Australia's four scientific research stations in Antarctica and the sub-Antarctic began last month when the Nella Dan sailed from Melbourne for Macquarie Island. Eighty-eight men of the Australian National Antarctic Research Expeditions (ANARE) have wintered at the three continental bases, Mawson, Davis, and Casey, and on sub-Antarctic Macquarie Island. Those in the Antarctic will be replaced early next month.

This season the Antarctic Division, Department of Science and Consumer Affairs, will use the Danish polar ships Nella Dan and Thala Dan again for relief operations. The Nella Dan, which returned to Melbourne late last month with the Macquarie Island winter party, will make two voyages south with the new expeditions for Mawson and Davis, and the Thala Dan will relieve Casey, and bring back the Macquarie Island summer party.

On her voyage to Casey early in January the Thala Dan will have aboard three women staff members of the Antarctic Division. They are Elizabeth Chipman (publications officer), Jutta Hosel (photograph officer) and Shelagh Robinson (welfare officer), who will spend more than a week at Casey. All have visited Macquarie Island before.

Women have travelled to Macquarie Island with ANARE since 1959, but this is the first time a group of women has been included in an Australian expedition to the Antarctic Continent. Only one other Australian woman, Mrs Nel Law, wife of Dr Philip Law, a former director of the Antarctic Division, has visited an Australian Antarctic station before. Mrs Law accompanied an ANARE expedition to Mawson and Oates Land in the 1960-61 season.

SUMMER VISITORS

Eighteen men will winter on Macquarie Island next year. The officer in charge is Mr D. W. J. McKenzie, of Yeerongpilly, Queensland. He and his party will spend the next 12 months carrying out a research programme which includes physics, biology, and meteorology. They will also undertake a building construction programme.

Summer visitors with the relief expedition, which is led by Mr W. F. Young, senior technical officer, Antarctic Division, included four women, who will carry out scientific and administrative work, a number of Australian Government scientists, members of universities from Victoria, Tasmania, and Queensland, two Queen's Scouts, and the chief wildlife officer of the Tasmanian National Parks and Wildlife Service. A detachment of nine men from the Army was responsible for the transport between the ship and the shore by amphibious vehicles.

An electronics engineer, Mr Ian Bird, who established an international reputation for his many contributions to Antarctic technology, has retired after 12 years with the Antarctic Division.

Mr Bird was senior engineer (electronics) in charge of the division's scientific instrumentation section. In 1973 he shared the Hayes Memorial Award of the Institution of Radio and Electronics Engineers for his work in the development of an unmanned geophysical station for use in Antarctica.

NORWAY PLANS EXPEDITION IN QUEEN MAUD LAND NEXT YEAR

Next year the first independent Norwegian scientific expedition to visit Antarctica since 1960 will spend about two months and a half in Queen Maud Land. The expedition of about 16 scientists, which is being organised by the Norwegian Polar Institute, will visit the western tip of Queen Maud Land during the summer of 1976-77.

Glacier studies, geology, biology, hydrographic studies, marine biology, and marine biophysics will be among the subjects to be covered by the expedition. This programme will continue the research carried out by Norwegian scientists in recent years. Norway has had no permanent station in the Antarctic since Norway Station was vacated in December, 1959.

As part of Norway's contribution to the International Geophysical Year Norway Station was established in Queen Maud Land at 70deg 30min S/2deg 32.2min W on December 31, 1956. The station was 55.7 metres above sea level, and 30 kilometres from the ice front.

The Republic of South Africa took over Norway Station on January 12, 1960, and established its own base, Sanae. During 1960 and 1961 the South Africans used the Norwegian base. But the buildings were covered by some 18ft of snow, and as a result the timber supports were cracked and the roofs began to cave in.

Therefore a site was selected for a new base at 70deg 18min 32sec S/2deg 21min 30sec W. The buildings were constructed in South Africa, and taken to Sanae by the relief ship R.S.A. on her maiden voyage at the end of 1961. During 1962 the buildings were assembled at Sanae and put in position on the new site.

Although Norway has no station in the Antarctic, it has been able to do research with American aid. Last season four scientists from the Norwegian Polar Institute carried out geological studies in the Ellsworth Mountains with logistic support from the United States, and two others took part in a United States ice core drilling project at the South Pole.

SOVIET NEWS

New Flagship built for Antarctic expeditions

This season the 21st Soviet Antarctic Expedition's fleet of research and transport ships has a new flagship, the 14,000-ton diesel-electric Mikhail Somov. She is named after the polar explorer, Mikhail Somov, who died last year. He was the first Soviet citizen to set foot on the Antarctic Continent in 1956, and commanded North Pole II, the second Soviet Arctic station on the drifting ice.

The new flagship, built at the Kherson shipyards, on the Black Sea, replaces the veteran research and supply ship Ob. In the winter of 1973 the Ob was trapped in heavy pack ice and drifted 450 miles in 90 days from the King George V Coast to the Davis Sea. She began her Antarctic career in 1956 when she took the first Soviet expedition to Mirny.

Designed for operations in the Weddell Sea, the Mikhail Somov's four engines develop 8000 horsepower. She will be able to negotiate ice up to 5ft thick.

One of the major tasks of this season's expedition, led by Gennady Bardin, will be the establishment of the new station, Druzhnaya (Friendship) on the northern edge of he Filchner Ice Shelf. Also it will relieve 224 men who have wintered at six Soviet stations.

Scientists of other nations sometimes spend two consecutive years in Antarctica. Soviet teams are relieved every year. But some scientists return for another winter after an interval of a year or two. Many have spent three to four years, and some even six years on the continent.

This year's scientific programme includes studies of the atmosphere, climate, geology, snow and ice cover, and other Antarctic phenomena. The Soviet Union will also contribute to the International Glaciological Project.

The research vessel Professor Vize will take part in the international programme Polex-South in Drake Passage between South America and the Antarctic Peninsula. Polex-South is part of the International Global Atmospheric Research Programme which studies the interaction between the ocean and the atmosphere, and its effect on the weather.

Scientists at Novolazarevskaya on the coast of Queen Maud Land recently completed a deep drilling project on the ice-cap. The drill reached bedrock at 1,230ft. A core was raised intact, and the drill hole was treated with a firming solution to keep the walls from crumbling. Instruments have been installed at various levels to record temperatures and movements of the ice mass.

MARINE MAP

The collection of Soviet marine maps of the Antarctic region has been complemented with one more work. This is a bathymetric map of Antarctica. It shows Antarctica and its surrounding Southern Ocean. Scientists and sailors can use the new map in their practical activities during voyages in the so-called Southern Ocean.

When the compilers of the map drew up the relief of the bottom, they tried to convey its characteristic features as explored by echo sounder measurements undertaken from the Soviet diesel-electric Ob which covered more than 80,000 miles. Special attention has been paid to the depiction of mid-oceanic submarine ridges, uplands and ramparts, deep troughs and island arcs.

In comparison with former general bathymetric maps of oceans, which included near-Antarctic waters, the new map gives a more detailed picture of the underwater relief. For example, the Crozet depression was formerly depicted as a moontonic plain. The new map shows that this depression is divided by a chain of hills into two parts.

The space of the ocean floor south of Prince Edward Island is depicted in quite a new way. Soviet scientists have discovered a gigantic volcanic highland here. There are two shallow banks on its summit which have been named after the Soviet ships Ob and Lena, which took part in the studies of the Soviet Antarctic marine expeditions.

The Antarctic ice-cap is shown on the map as if it were transparent. This has made it possible to show the ridges and lowlands that have been discovered by geophysical methods under the ice during tractor traverses into the interior. The names of geophysical features on the map commemorate many outstanding scientists, explorers and sailors of the Soviet Union and other countries who have contributed to the study of Antarctica.

NEW NAMES

A special study of 881 new names that have appeared on maps of Antarctica in recent years has been made at the Soviet Arctic and Antarctic Research Institute in Leningrad. The writers are a geographer, L. Dubrovin, and an engineer, M. Preobrazhenskaya, who have taken part in many polar expeditions.

Mountain ranges, islands, lakes, and other geographical features have been named to commemorate men who gave their lives in the fight against the hostile environment of Antarctica — Ivan Khmara, the first Soviet citizen to die in the Antarctic, Oldjiz Kostka, and Vasily Ryskalin. Other features have been named in honour of cosmonauts, scientists, writers, composers, artists, and other Soviet personalities. Antarctic maps now bear the names of the Kurchatov Mountains, the Bellingshausen and Moscow University Shelf Glaciers, the Gagarin Mountain Ridge, and the Tereshkova Oasis.

British explorers gave the names of the Russian composers Borodin, Glinka, Mussorgsky and Tchaikovsky to geographical features on the Antarctic Peninsula. Early in 1975 a peninsula in this region was named by the British after the Soviet composer Shostakovich.

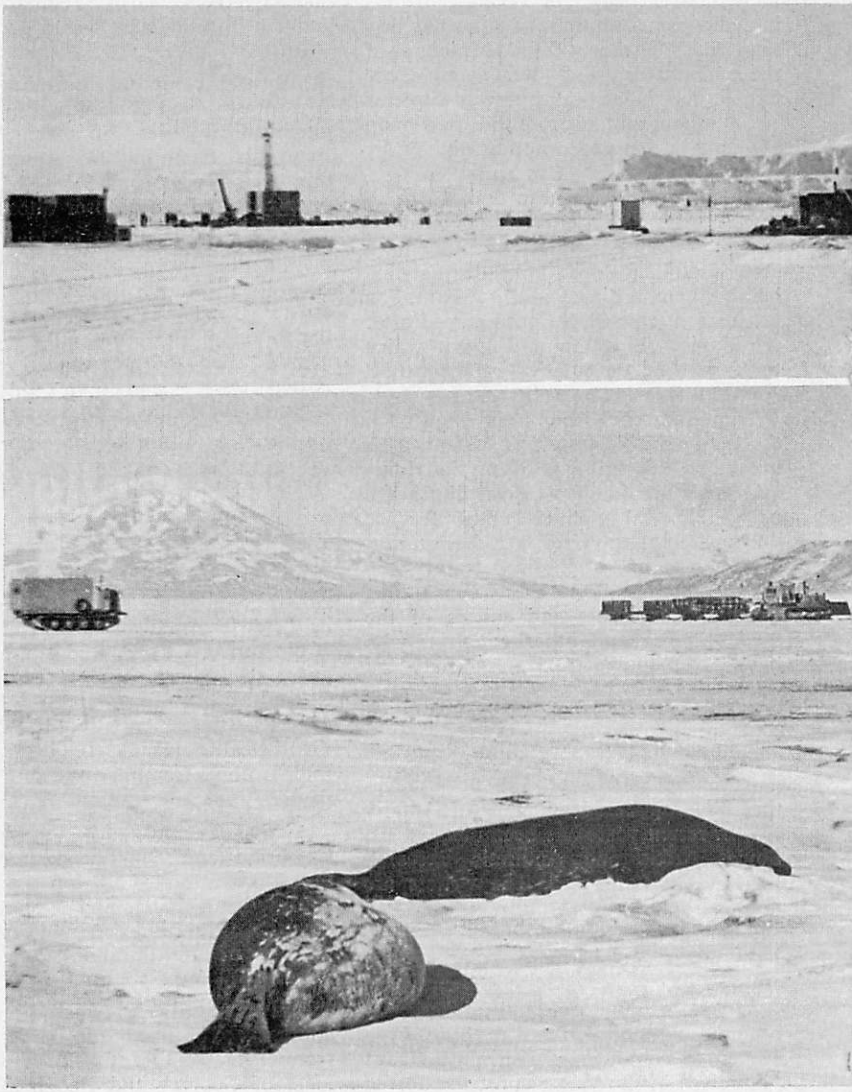
Soviet explorers pay in kind in this respect; they have named a number of geographic objects after foreign explorers. For example, fringe seas washing the shores of East Antarctica have been named after the Norwegian scientist, Riiser-Larsen and the Australian explorer Sir Douglas Mawson.

SYMPOSIUM ON GEOLOGY

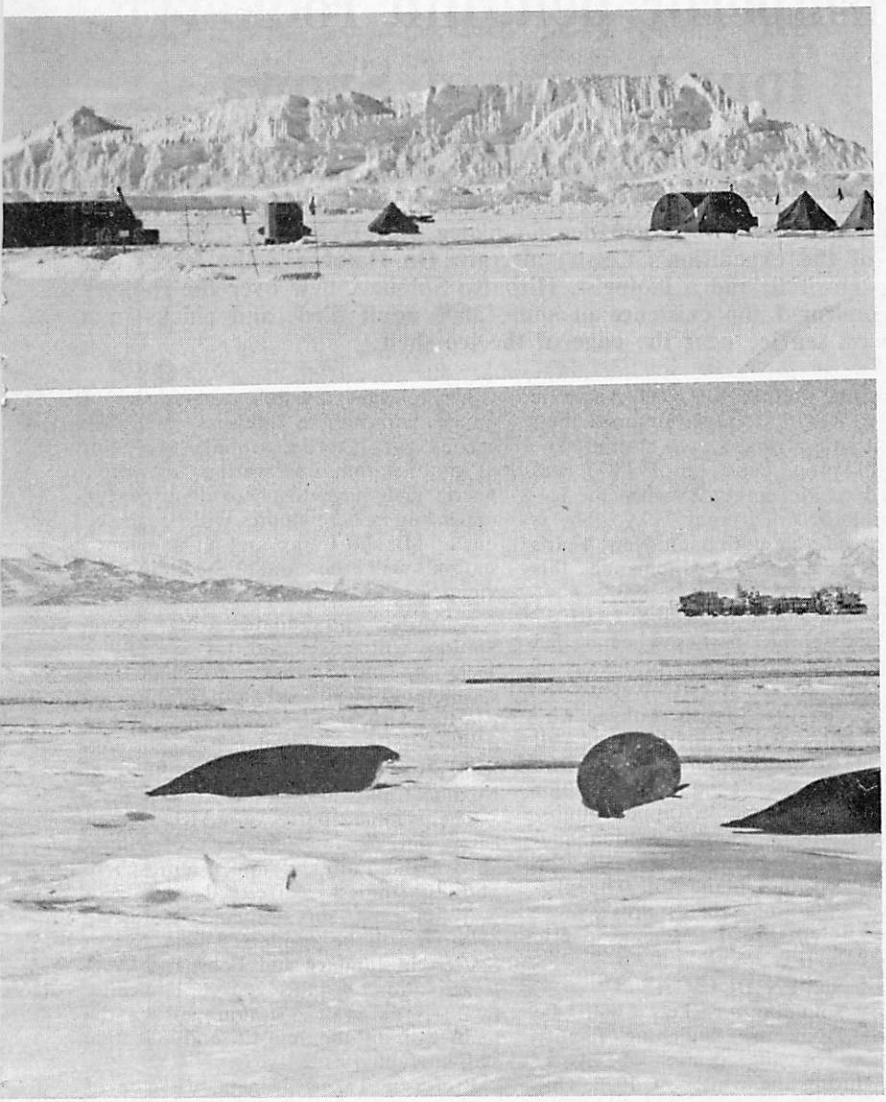
An international symposium on Antarctic geology and geophysics will be held from August 22 to 27, 1977, at the University of Wisconsin, Madison, under the sponsorship of the Scientific Committee on Antarctic Research (SCAR), the International Union of Geological Sciences (IUGS), and the Inter-Union Commission on Geodynamics.

A five-day field trip on the Pre-Cambrian and Quaternary geology of the Lake Superior region is planned before the meeting, and a shorter trip on the Pre-Cambrian and Paleozic geology of the Baraboo Range afterwards.

Early preliminary registration is encouraged. The first circular is available from Professor C. Craddock, Department of Geology and Geophysics, University of Wisconsin, Madison, Wisconsin 53706. He is chairman of the SCAR working group on geology.



Drilling into the seabed of McMurdo Sound from a platform on the annua last month. In the photograph above a giant iceberg half a mile away and mo Base. Below a tractor train hauls drilling equipment across the sea ice to the dril



ice was done for the first time in the final phase of the Dry Valley Drilling Project
e than 200ft high is the backdrop for the drilling camp 70 km north-west of Scott
l site. In the foreground Weddell seals lie sunning themselves on the ice.

Antarctic Division, D.S.I.R. Photos by Neville Peat

Emperor penguin rookery found west of Syowa

A large Emperor penguin rookery has been found by the 16th Japanese Antarctic Research Expedition (JARE-16) about 180km west of Syowa Station. The rookery was spotted at the eastern side of the Riiser-Larsen Peninsula at 35deg E—69deg S on October 1 during a test flight of the expedition's Cessna aircraft. On October 2 the leader, Dr Takao Hoshiai, and a biologist, Hiroatsu Shimizu, flew over the rookery and confirmed the existence of some 3000 adult birds and chicks in a group on sea ice near the edge of the ice shelf.

With the return of the Antarctic spring JARE-16 scientists resumed their field activities from Syowa Station. The JARE-17 programme for 1975-77 was initiated on November 25 when the ice-breaker Fuji sailed from Tokyo. She is expected off the station on New Year's Day after calling at Fremantle this month.

There are 40 men in the JARE-17 winter and summer parties. They are led by Dr Takeo Yoshino, professor of radio physics at the University of Electro-communication in Tokyo, who wintered with JARE-3 in 1959, and will winter at Syowa Station again.

JARE-17 will conduct a major scientific programme of upper atmosphere physics at Syowa Station and Mizuho Camp about 300km to the south-east on the inland ice. The programme is part of Japan's involvement in the International Magnetospheric Study (IMS, 1976-1979).

SEVEN ROCKETS

Seven sounding rockets will be launched from the launching facility south-west of the centre of Syowa Station during the winter of 1976. One of these rockets is the newly-developed S-310JA, which weighs 670kg, is 6.8m long, and has a diameter of 310mm. Its payload is 40kg, and its peak altitude is 220km.

Signals sent from scientific satellites will be received by an auto-tracking reception system which will be installed at Syowa Station in January next year. Other relevant research programmes of upper atmosphere physics will be carried out. In order to make two-point or multi-station observations of ionospheric and magnetosphere disturbances, upper atmosphere studies will be carried out at Mizuho Camp and an unmanned station will be established in the vicinity.

Scientific programmes at Syowa Station will cover various disciplines such as meteorology, geomagnetism, seismology, sea ice studies, biology, geochemistry, geomorphology, and medical science. The glacial-meteorological programme will be continued at Mizuho Camp during the winter.

The summer party of JARE-17 will carry out marine science programmes aboard the Fuji and upper atmosphere physics studies. Terrestrial and geomorphological surveys, and biological research will be conducted near Syowa Station in January and February, 1976. Reactivation of the rocket launching facilities at Syowa Station will be the main task of the logistic and scientific staff in January next year.

Professor Takesi Nagata, director of the National Institute of Polar Research, who led JARE-1, 2, and 3, will return to Syowa Station as an observer of JARE-17, Mr George Laurent, a French upper atmosphere physicist, will also join the JARE-17 summer party on board the Fuji, which is expected to leave the Antarctic at the end of February. The icebreaker, which carries a

crew of 34 officers and 148 men, including pilots for her three helicopters, is commanded by Captain Tsunezo Kuramoto, who is making his third Antarctic trip. She will call at Port Louis, Mauritius, from March 12 to 17, and the JARE-16 winter party will fly from there to Tokyo.

SPRING JOURNEYS

Spring journeys from Syowa Station began in August when a party of earth scientists made a trip south near the Shirase Glacier. They made geological, geomorphological, geochemical and meteorological studies, and made a terrestrial survey of the coastal area south of Syowa Station. Another party made a trip to Mizuho Camp, laying caches, and making glaciological and upper atmospheric physics studies. Field surveys of exposed rock areas along the Soya Coast south of Syowa Station were also begun.

Early in November a traverse party led by Dr Yukio Matsumoto was dispatched from Syowa Station to the Yamoto Mountains about 300km to the south to continue the search for Yamoto meteorites, and to make a terrestrial survey. There are several bare ice areas in the southern end and western side of the mountains, and Yamoto meteorites were found on the surface of these areas for the first time in 1969, and again in 1973 and 1974.

This season the Yamoto Mountains party will remain in the field until the end of January 1976. Last season's party which was in the area for three weeks found 659 meteorite samples altogether some of which might be non-meteorite samples. Nine samples found in December, 1969, were designated Yamoto (a) to (i) in that order, and 12 samples found in December, 1973, were designated (j) to (u).

Last season's party of four men included one geologist, Dr Keizo Yanai, now a research associate at the National Institute of Polar Research, who was a member of the Japanesese South Pole traverse party in 1958-59. It left Syowa Station with two snow vehicles and sledges and after some mechanical trouble reached the southern end of the Yamoto Mountains on November 24 when two meteorite samples were found.

MIZUHO TRAVERSE

From November 24 to December 29, 1974, the party found 659 samples, the largest of which weighed about 5kg, and was about 20cm in diameter. Most of the samples were less than 10cm in diameter. They were designated as Yamoto 74001 to 74659, and were catalogued at the National Institute of Polar Research where they will be subjected to further detailed study.

A traverse from Mizuho Camp to about 77deg south, glaciological research and drilling of the ice-cap at the camp were other field activities last season. Glaciological programmes in inland areas were started in 1969, and were concluded in 1974-75. The main task was to remeasure the snow accumulation stakes and the strain grid between Mizuho Camp and the Sandercock Nunataks in Enderby Land in conjunction with the deep drilling of the ice-cap.

A glaciological party made a traverse to the south, reaching about 77deg S. It started from Mizuho Camp on October 1 and returned at the end of November. This party initiated the resurvey of the strain grid network between Mizuho Camp and the Sandercock Nunataks where the survey by Australian and JARE parties was expected to be tied.

Because of an unexpectedly heavy snow accumulation near the Sandercock Nunataks, the party failed to find the stakes which were installed in the summer of 1970-71 by a JARE-11 party. The party also met difficulties in a crevassed area about 300km from the Sandercock Nunataks and had to return to Mizuho Camp.

Ice core drilling at Mizuho Camp was carried out from December, 1974, to the end of January, 1975 with the assistance of members of JARE-16 who joined the drilling team from the middle of January. Because of the sticking of the thermal drill head in the ice, drilling had to be stopped at a depth of 147m. Ice cores, and other snow and ice samples were brought back to Japan.

This season Japanese scientists will continue their co-operation with those from New Zealand and the United States on the final stage of the Dry Valley Drilling Project, which began last month. They are Dr Katsutada Kaminuma, geophysicist at the National Institute of Polar Research, Dr Nobuyuki Nakai, a geochemist at Nagoya University, who also holds an additional post at the National Institute, and Dr Tetsuya Torii, a geochemist at the Chiba Institute of Technology. Drs Kaminuma and Nakai who are now working at McMurdo Station, expect to attend the DVDP Seminar in Wellington next month.

SUMMER PARTY (1975-76)

Members of the 17th expedition are: Takeo Hirasawa (deputy leader); Yukihiro Ohniwa (physical oceanography); Nobuyuki Shibayama (chemical oceanography); Tsutomu Mayama (marine biology); Takehiko Gomi (surveyor); Michio Nogami (geography); Yoshikuni Ohyama (biology); Mizuo Sato (upper atmosphere physics); Hiroo Nishizima (construction engineer); Fusashi Ito (general assistant).

WINTER PARTY (1975-1977)

Takeo Yoshino (leader); Kikuji Yoshida, Jitsuki Hokama, Kunio Enoshima, Yoshio Kato (meteorology); Akihisa Yamakoshi (ionoshperic physics); Toshio Haneda (geophysics); Hiroshi Fukunishi, Kazuo Makita, Toshiro Matsuo, Tsutomu Sasaki, Kunio Nikki, Yoshio Koinuma, Koji Nakai, Osamu Mariko (upper atmospheric physics); Ryozo Goto (physical meteorology); Masaaki Wakatsuchi, Fumihiko Nishio (glaciology); Masatake Murakami (medical science); Shigeo Shiga, Koji Kasaba, Shigeo Takahashi, Shigeki Mitsuyama (mechanic); Hiroaki Yoshizawa, Masao Yamada, Masao Aihara (radio operator); Masahiro (Ishida, Kazuji Mochizuki (cook), Tatsuro Yoshiyama (doctor); Hiroshige Shibano (general assistant).

FIRST TO FIND EMPEROR PENGUIN'S EGG

Lance Corporal A. H. Blissett, Royal Marine Light Infantry, who served with Scott's Discovery expedition of 1901-1904, was not the first man to find an Emperor penguin's egg. The honour belongs to an anonymous Frenchman.

Blissett, who settled in New Zealand after the First World War, has been given a place in Antarctic history on the evidence of a statement in Scott's "The Voyage of the Discovery". (See "They Came Back to Lyttelton." Baden Norris. "Antarctic", June, 1975 Page 190). But Dr Bernard Stonehouse, a world authority on penguins, tells a different story in a letter to the Editor.

Dr Stonehouse says that the first Emperor egg was picked up, not by Blissett, but by an unrecorded member of Dumont d'Urville's expedition between 1837 and 1840. Known as the Dreyton egg, it was found on the sea ice, sold privately, and ended up in the Norwich Museum, where it is today. Edward Wilson mentions the egg in his 1907 report ("Zoology", Volume II.)

Dr Stonehouse, who is now at the School of Environmental Science, University of Bradford, has studied the ecology of Antarctic, sub-Antarctic, and temperate-latitude penguins on expeditions with the Falkland Islands Dependencies Survey (now British Antarctic Survey), the University of Canterbury Antarctic biological unit, which he led for five years, and while he lived in New Zealand. He is a member of the New Zealand Antarctic Society.

SANAE REPORT

Geological parties head for Kirwan escarpment

A field trip to bring back all the stores and supplies from depots between Sanae and Grunehogna, 230km to the south, was the main task of the 16th South African National Antarctic Expedition (SANAE 16) when the winter in Queen Maud Land ended. All the supplies have to be returned because SANAE'S earth sciences programme has been suspended for two years. Early in January SANAE 17 will arrive to relieve the present team at Sanae. All the members of the new team have been selected, and began their training in Pretoria last month.

A full-scale storm delayed the SANAE 16 field party for a week. It did not leave the base until September 21, much later than usual. At the same time the geological team of five men, which had wintered at Grunehogna, left for the Kirwan Escarpment.

Soon after the team's departure one vehicle broke down, and two men had to stay behind. Communication was established with Sanae, and another vehicle left with spare parts. After many delays, and a nerve-wracking journey through a stretch of crevasse area, it reached Grunehogna, and the broken vehicle was repaired.

Then the Grunehogna team continued towards Borga, which is 380km from Sanae, to meet the geologists from the base's winter team. Both parties will not meet again until they return to Sanae early in January.

Most of this season's geological work will be done in the Kirwan Escarpment, south of Borga Base. When the earth sciences programme is resumed in 1978 geological parties will have helicopter support.

While the field party was on its way north again, collecting all the depot stores on the route, the men at Sanae had more work to do. But they found time for fun. The return of summer apparently made one man forget where he was. He tried to prove that a barbecue could be held on the snow, but when he turned around to turn the meat over, he found that his fire had sunk several feet below the melted snow surface.

Snow has been a pre-occupation of the Sanae team this year. There has been such an accumulation on the surface above the base buildings that the hatches which provide access to the outside world have had to be cleared three times.

MARION ISLAND

Towards the end of the winter the men on Marion Island had no water for a week because of frozen pipes. Water had to be carried in buckets from a nearby pond so the meteorologists could continue their twice daily balloon launchings.

Next month four biologists who will work on the bio-energetics programme arrive aboard the French research ship Marion Dufresne to join the present team on the island. In April next year the ornithological programme will be expanded by more research on subjects hitherto untouched.

In October the Marion 32 team had two "visitors" from a French yacht. While the yacht sailed round the island, the "visitors" were introduced to the team, and were given a conducted tour of the base and laboratories.

After half an hour the "visitors" could not control their laughter. They were well disguised members of the team hidden behind dark glasses, with beards and moustatches shaven off, long

hair hidden under balaclavas, and wearing the clothes they had brought from South Africa.

Some major construction projects were completed when the 21st relief team arived at Gough Island in October. A radio technician for the team was obtained with some difficulty. Since the introduction of television in South Africa, radio technicians are in great demand.

During the relief period a non-directional radio beacon mast 30m high was erected for civil aviation navigation. The landing stage, snapped off during a storm, was replaced, and the floor support beams, which had rotted because of the high humidity, were strengthened.

WOMEN SCIENTISTS WORK AT SOUTH POLE STATION

Two American women scientists are working at the South Pole this season. Women have visited the Amundsen-Scott South Pole Station before but none worked there until Miss Nan Scott took part in a medical research project last season. Earlier this year the Australian Minister of Science decided to allow women scientists to work on Macquarie Island in the summer as a contribution to International Women's Year. His successor has since decided to allow women to work on the Antarctic Continent for the first time.

This season about 30 women will work at American, New Zealand and Australian bases. The Americans and New Zealanders have been selected basically because they are needed in the research programmes.

Three Australian women will spend several weeks at Casey, the base on the Budd Coast of Wilkes Land, which is manned by a team of 26. One of them is Miss Elizabeth Chipman, publications officer for the Antarctic Division, Department of Science. Four other women will go to Macquarie Island in the sub-Antarctic.

At Casey and on Macquarie Island the women will work on communications, biological studies, a film for the Australian Broadcasting Commission, and other projects.

When a United States Navy Hercules aircraft made the second flight of the season to the Pole Station Mrs Donna Muchmore and Miss Scott were aboard. They flew there to assist Dr Harold G. Muchmore, of the Oklahoma Medical Research Foundation in his studies of human adaptation to the stresses of living through the winter at the South Pole. Mrs Muchmore is the wife of the principal investigator.

WORK ON KRILL

On the other side of the continent two more American women scientists will study krill in the Bransfield Strait and the Scotia Sea. Dr Mary Alice McWhinnie and Charlene Denys will work from Palmer Station on Anvers Island off the Antarctic Peninsula, and from the research vessel Hero. Dr McWhinnie, of Depaul University, Chicago, was one of the first two women scientists to winter in the Antarctic.

Fifteen other American women will work at McMurdo Station, Ross Island, this season. They will do meteorological, communications, and medical duties. One is a secretary, and another an administration officer.

Two New Zealand women are working with university expeditions in the field. Another is a meteorologist at

Scott Base. And a Welsh-born geologist, Dr Susan West, worked for eight years with the British Antarctic Survey, but had to come to New Zealand to get to Antarctica.

Britain has yet to send women to Antarctica. There is no provision for short visits in the summer, and teams sent to Antarctic Peninsula bases usually winter there.

Dr West did her Ph.D. thesis on the petrology of the Danco Coast of the Antarctic Peninsula. She will spend six weeks in the dry valleys of Victoria Land, west of Scott Base, collecting rocks and fossils for the Antarctic centre of the Canterbury Museum.

With Dr West will be Mrs Margaret Bradshaw, mother of two young children, who is the museum's geologist. Antarctica appears to be in the family. Her husband, Dr John Bradshaw, a university lecturer in geography, took part in a major expedition to the Bowers Mountains in Northern Victoria Land last season.

New Zealand women have been working in Antarctica for five years, mainly in the field, and their demands on accommodation at Scott Base have been minimal. Provision for women to live at Scott Base has been made in the rebuilding plans. And the Ministry of Works architect assigned to the project is a woman, Miss Ros Empson.

In the last 20 years the male monopoly of Antarctic has been broken many times by women tourists, women members of the crews of Soviet ships, and women scientists who have worked in Antarctic waters. A marine geologist, M. Klenova, was a member of the first Soviet Antarctic expedition in 1956, and others have been a biologist, E. Korotkevich, a hydrochemist, M. Konovalova, and an aerologist, N. Kazakova.

And a French woman engineer, Mrs Christine Gillet, has been to the Antarctic for the last 12 years. She made her seventh visit to Dumont d'Urville in Adelie Land last season. There, as chief engineer, she supervised the construction and servicing of buildings and power supplies.

Mrs Gillet has a typically Gallic approach to the questions of women in Antarctica. She says it is no more difficult for a woman than a man; the only problem is having to have a separate room.

New Zealand Science Congress

Sir Vivian Fuchs, who retired from the position of director of the British Antarctic Survey two years ago, will be the official guest speaker at the 13th New Zealand science congress in Dunedin from May 10 to May 14 next year. One of the five major themes of the congress, which will be under the auspices of the Royal Society of New Zealand, will be Antarctic.

An Antarctic symposium will be held during the congress. Interested speakers are invited to contribute to the symposium which will have the following three sessions:—

(a) Research in Antarctica with particular reference to the natural history of the Ross Dependency, and the dry valley region.

(b) Global implications of Antarctic research—researches showing the position of Antarctica for baseline studies in the sciences; monitoring programmes and world environmental studies, e.g. climatic, oceanographic, geophysical etc.

(c) The future of Antarctica. Resources of ocean and continent, questions of exploitation, conservation, radio-nucleide dumps, international and domestic issues in Antarctica, tourism, occupational research programmes, the law and Antarctica, New Zealand's role in Antarctic affairs.

Information on the Antarctic symposium can be obtained from Mr J. T. Darby, convener, Antarctic Section, XIII N.Z. Science Congress, c/o Otago Museum, Great King Street, Dunedin. Further information on the congress is available from the secretary, 13th Royal Society of New Zealand Science Congress, Department of Physics, University of Otago, P.O. Box 56, Dunedin, New Zealand.

SUB-ANTARCTIC

Scientific study of sheep left on Campbell Island

Campbell Island's flock of wild Merino cross sheep, abandoned more than 40 years ago, are being studied this summer by New Zealand scientists to determine the long-term effects of their removal on the island's natural flora and fauna. The expedition, divided into short-term, first-term, second-term, and full-term parties, will also study the plants, animals, birds, soils, and geology of the island.

Early last month the first party led by Mr N. J. Judd, a reserves ranger with the Department of Lands and Survey, sailed south in the motor vessel Acheron. On her second trip the Acheron took the second-term party, and brought back members of the short-term party. Research on the island will end early in February when the rest of the expedition will return aboard the Royal New Zealand Navy's frigate Taranaki.

Campbell Island, 663km south of the port of Bluff, is controlled by the Department of Lands and Survey, and since 1954 has been a reserve for the preservation of flora and fauna. When the island was abandoned as a sheep station in 1931, large flocks of merino cross sheep were abandoned.

Between 1931 and 1961 the sheep population declined steadily from about 4000 to 1000. But in the next eight years the numbers increased to about 3000. There were misgivings about the possible effects of an expanding sheep population on native flora and fauna, particularly the Royal albatross. But in eight years while the sheep increased threefold, the albatrosses also increased from about 2,300 to 4,400 breeding pairs.

SHEEP KILLED

In 1970 a fence was erected across the narrow waist of the island, and all the sheep in the northern half were killed off. The purpose was to secure a good part of the island's vegetation against damage by sheep, and to study the long-term interaction between the animals, the vegetation, and albatrosses. About 1500 sheep remained on the southern side of the fence.

As part of the expedition's studies, the leader, Mr Judd, will trap some live sheep. A representative sample will be tested for disease, and if the results confirm reports that the flock is free from the common diseases of New Zealand flocks, 10 will be captured later and brought back aboard H.M.N.Z.S. Taranaki for evaluation by the Ministry of Agriculture and Fisheries.

Scientists from four universities, the Department of Scientific and Industrial Research, the Wildlife Service, the Ministry of Agriculture and Fisheries, and the Australian Commonwealth Scientific and Industrial Research Organisation, are taking part in the Campbell Island studies. Their research will include the following projects:

SHORT-TERM PARTY

Mr I. Campbell, of the Soil Bureau, D.S.I.R., will make an assessment of the erosion problem on the island. He will study the likely contribution by sheep to past erosion, and by those on the south side of the fence to future erosion. In additon he plans study of the soils of the island, and an examination of the peats and pleistocene deposits for comparison with those on

other outlying islands such as the Auckland and Chatham Islands.

Dr F. M. Climo, of the National Museum, is revising the taxonomy of the Australian representatives of the small land snails belonging in the family Punctidae. His research is required to fit the Campbell Island fauna into the complex pattern of species and subspecies in the New Zealand sub-Antarctic. He also plans to make ecological notes of the faunal assemblages and the intertidal zone of the island.

Dr P. R. Wilson, of the Ecology Division, D.S.I.R., will establish liaison with other members of the first-term party. He will also, on his return, brief Mr J. P. Dilks, of the Ecology Division, who is in the second-term party.

FIRST-TERM PARTY

Mr C. J. R. Robertson, of the Wildlife Service, will continue the studies of the Royal albatross conducted by the National Museum and the Wildlife Service, especially the ecological requirements of their habitat. He will assess the population sizes of the black-browed mollymawk, grey-headed mollymawk, and wandering albatross, and will study the behaviour displays of the two mollymawks and the sooty albatross. Other work will include an assessment of the numbers and taxonomic status of the giant petrel, and a faunal survey of Dent Island and other offshore islets.

Mr R. Russ, of the Wildlife Service, will assist the leader, Mr Judd, in the maintenance of the fence across the island. He will also make a census of albatrosses and sheep (the latter being destroyed) north of the fence.

Mr A. C. Heath, of the Wallaceville Animal Research Centre, will carry out postmortem examinations of a large sample of the island sheep. His purpose is to obtain data on the epidemiology and population dynamics of some sheep parasites and pathogens. He also plans to study the effects of ticks and lice on sea birds.

Mr J. B. Hutton, of the Animal Health Division, Ministry of Agriculture and Fisheries, will monitor the health status of the island fauna, with emphasis on the sheep population, to learn about the possibility of different disease patterns developing between sheep populations in New Zealand and on the outlying islands. He will make observations of the fauna before and after death to define the range of syndromes encountered.

Mr W. R. Regnault, of the wool department, Massey University, plans to inspect all or as many of the sheep as possible to record the incidence of weak back wool, and over or under shot jaws. He also proposes to shear and weigh the fleeces of some sheep of known age. Weak back wool is the cause of the culling of many thousands of otherwise good breeding ewes in New Zealand each year. Mr Regnault, who has worked on a short-term unselected flock at Massey University, wants to observe the long-term effect of natural selection on the culling factor.

Dr T. K. Crosby and Mrs M. B. May, Entomology Division, D.S.I.R., will continue the arthropod survey to see if it is possible to relate the arthropod fauna to different vegetation and soil types, and to survey arthropods' association with vertebrates. Mrs May's study will refer particularly to associating immature forms with adults; Dr Crosby will be concerned with stream fauna.

Dr G. F. Van Tets, of the Division of Wildlife, Commonwealth Scientific and Industrial Research Organisation, will study the nest ecology and behaviour of the endemic Campbell Island shag. His research is part of a long-term comparative study of the shags and cormorants of Australia and New Zealand.

SECOND-TERM PARTY

Dr D. G. Given, Botany Division, D.S.I.R., will study the compistae and ferns of the island. In association with Mr C. D. Meurk, of the botany department, University of Otago, he will study the conservation status of individual plant species for the New Zealand rare plants register, and the taxonomic status of certain problem exotic species.

Mr Dilks and an assistant from the Ecology Division, D.S.I.R., will continue studies of the interactions between sheep, the vegetation, albatrosses, and other Campbell Island fauna. The projects will include the distribution and number of the wild sheep south of the fenceline, the numbers and range of the wild cattle, and the distribution and numbers of nesting southern Royal albatrosses both north and south of the fenceline. Changes in the vegetation and erosion will be monitored, using photography from permanent points mostly established in 1970.

Mr P. M. Johns, of the zoology department, University of Canterbury, will continue work done previously on Campbell Island, Auckland Island, Snares Island, and Antipodes Island.

Messrs J. M. Beggs and P. A. Morris, geology department, University of Otago, plan to make a modern geological study of the island to supplement the work done by Professor P. Marshall in 1907. They propose to revise the geological mapping of the island, paying particular attention to the areas of metamorphoric and sedimentary rock as well as the more common volcanic rocks.

Mr P. C. Harper, of the zoology department, Victoria University of Wellington, is engaged on a research programme into the ecology of albatrosses and petrels, including studies of the racial evolution and relationships of oceanic birds, and their life cycles. He wishes to establish whether the Antarctic and Fairy prions breed on Campbell Island in order to complete an ecological and taxonomic paper.

FULL-TERM PARTY

Mr Meurk will continue ecological studies on behalf of the Ecology Division. These will involve re-mapping the 20 permanent quadrats established on either side of the island fence to pick up the early recovery stages in the grazed swards on the northern side, and possibly any slower and background trends in other communities and to the south.

Mr Meurk will also study the genera Acaena, Blechnum, Rostkovia in connection with a number of taxonomic problems, and make productivity comparison studies of zones equivalent to the Otago alpine grassland, covering selected areas of Chionochloa antarctica, Poa litorosa, Marsippospermum gracile, and Dracophyllum scrub.

In the first term Mr Meurk will work with Mr Robertson on a botanical survey of an offshore islet. This supports probably the only pristine zonal community in the region. Permanent line transects and quadrats will be established during the survey.

THALA DAN NOW REBUILT

After nearly 20 years' service in the Arctic and the Antarctic the Danish polar expedition ship Thala Dan has been rebuilt and modernised. The Thala Dan made her first trip to the Antarctic in 1957 with an Australian expedition, and since then she and her sister ship Magga Dan have taken relief parties to Australian and French bases each season.

Accommodation for passengers and crew has been entirely rebuilt and extended by the addition of a new superstructure deck aft. The Thala Dan now has new and larger chilled and deep freeze cargo holds, gear to lift 10 tons of cargo, and her temporary helicopter deck has been replaced by a permanent, larger landing deck.

"Silas" Wright was Antarctic and naval scientist

One of the last survivors of the shore party of Scott's Terra Nova expedition, Sir Charles Seymour Wright, died in Victoria, British Columbia, on November 1. He was 88. Another member of the shore party, Sir Raymond Priestley, died last year, and the last survivor is Tryggve Gran, the Norwegian ski expert, now 86, who lives in retirement at Grimstad, Norway. Gran and Wright were the last two members of Edward Atkinson's search party which found the bodies of Scott, Wilson, and Bowers just 11 miles south of One Ton Depot.

Affectionately known by his colleagues as "Silas" after Silas K. Hocking, an American novelist, Charles Wright was a young Canadian physicist who became the expedition's glaciologist in the Antarctic. After his return to England and service in the First World War he began a distinguished career as a naval research scientist. As a glaciologist he played a leading part in the expedition's field work, and was a member of the Western Party which explored the Koettlitz, Ferrar, and Taylor Glaciers under the leadership of his friend and colleague, Griffith Taylor.

Scott held the young Canadian scientist—he was only 23 when he went south—in high regard. There are references in his journal to Wright's intelligence and energy—"a hard and conscientious worker"—and in another entry he is described as "good-hearted, strong, keen, striving to saturate his mind with the ice problems of this wonderful region." And in October, 1911, when he was preparing for the South Pole journey, Scott wrote: "One of the greatest successes is Wright. He is very thorough and absolutely ready for anything . . . Nothing ever seems to worry him, and I can't imagine he ever complained of anything in his life."

Charles Wright was a member of the first supporting party—Atkinson, Cherry-Garrard, and Keohane — which turned back on December 21, 1912, at the top of the Beardmore Glacier (the Upper Glacier Depot, 85deg 7min S). Scott noted: "All are disappointed—poor Wright bitterly, I fear."

SIR CHARLES WRIGHT

PART IN SEARCH

Apart from his fine work as a scientist with the expedition Charles Wright has a place in Antarctic history for the part he played in the search for the bodies of Scott and his companions. The story has been told many times. On October 30, 1912, the seven Indian mules and eight men making up the Pony Party started south. Charles Wright was in command because he was a skilled navigator. Atkinson followed on November 1 with Cherry-Garrard, Demetri Gerof, and the two dog teams.

On the morning of November 12 when the party had marched 11 miles Wright saw "a curious-looking and very large cairn off to the west. Through the glasses he could see a number of poles sticking up beside it. It was in a place where he had not expected anything to be. He told the mule party to continue south on its track, and went over on ski to see what the strange object was. It was the tent.

Wright tried signalling to the mule party to come over but they did not understand very well. Eventually they came over, made camp, and waited for Atkinson to come along a couple of hours later.

Charles Wright was born in Toronto, and educated at Upper Canada College. He was an undergraduate at Gonville and Caius College, Cambridgem, and did research at the Cavendish Laboratory between 1908 and 1910. He and Griffith Taylor were fellow-members of an informal club of research students. Taylor persuaded Sir Douglas Mawson to come and talk to the group, and Wright applied to join Scott's expedition as physicist because he thought his research on penetrating radiation might be quite different in the Antarctic.

Although he was rejected for the post one day, Wright was accepted the next by Scott on Wilson's advice. Taylor had persuaded him to walk from Cambridge to London to see Scott and Wilson and at the same time, to see if they could walk the 50 miles in 10 hours. On the voyage south when his nickname was "Jules Verne" for a reason never explained, Wright became interested in Antarctic icebergs, and Wilson engineered his re-appointment as the expedition's glaciologist, and he became eligible for field work away from Cape Evans.

WAR SERVICE

After his return to England Wright was appointed a lecturer in cartography and surveying at Cambridge. He served with the Royal Engineers in the First World War and won a Military Cross. Later he was in command of wireless, Second Army, and finally was awarded the O.B.E. for his work as an intelligence officer at General Headquarters.

In 1919 Wright began his distinguished career as a naval research scientist. He joined the Admiralty Department of Scientific Research and Experiment, and after 10 years there became superintendent of the Admiralty Research Laboratory at Teddington. From 1934 to 1946 he was Director of Scientific Research at the Admiralty, and when the Royal Naval Scientific Service was formed in 1946 he was appointed its first chief. He was knighted the same year.

Wright retired in 1947, but almost immediately became adviser for the Admiralty with the British Joint Services Mission in Washington. Then he returned to North America to continue his own research, working at the physical laboratory of the Scripps Institution of Oceanography, California, the Pacific Naval Laboratory of the Defence Research Board of Canada, and the University of British Columbia.

After his second "retirement" in 1955 Wright continued to be actively engaged in research projects. And for four years before he finally retired in 1968 he lectured in geophysics at the Institute of Earth Sciences, University of British Columbia.

RETURN SOUTH

In 1960 Wright returned to the Antarctic at the request of the Canadian Defence Research Board in association with Stanford University to carry out research into the fluctuation of the earth's geomagnetic field. During his stay at McMurdo Station he visited Cape Royds and his old home at Cape Evans, where he was intensely interested in the work of the New Zealand Antarctic Society's hut restoration party. He was the popular guest of honour at Scott Base for Christmas dinner. Perhaps his most joyful experience in the Antarctic was to stand beside the bunk in the hut at Cape Evans which he had occupied 50 years before.

When he was 77 Wright returned to the Antarctic for the third time. He worked with the United States Antarctic research programme at Byrd Station. And once again he visited the historic huts, and climbed Observation Hill to see the cross erected in memory of the men with whom he struggled up the Beardmore Glacier 53 years earlier.

Wright's report on the glaciological work of the Terra Nova expedition, written jointly with his brother-in-law, Sir Raymond Priestley, and published in 1922, became a classic in its field.

After he retired to live on Saltspring Island, near Vancouver, Wright was always most generous with his memories of Terra Nova days when writers and historians sought his help. In 1968 he found time to write an article for "Antarctic" (June, 1968, Pages 109-111) on the role of fuel in Antarctic discovery and research, which dealt also with old and newer methods of transportation, particularly the mules and the motor sledges.

Scientists' studies of penguins

New Zealand scientists who have worked at Cape Royds and Cape Bird on Ross Island with the University of Canterbury Antarctic biological research unit in the last 15 years are well represented in "The Biology of Penguins", published by McMillan Press Ltd as part of a series on biology and environment. The 555-page book is edited by Dr B. Stonehouse, formerly a reader in the university's zoology department, and now director of the School of Environmental Science, University of Bradford.

Dr Stonehouse, who is an Englishman, headed the research unit at Cape Royds for five years from the 1960-61 season. Since the 1966-67 season the unit has worked at Cape Bird. Dr Stonehouse, who provides a general introduction, previously worked for the British Antarctic Survey at Antarctic Peninsula bases.

Another English member of the zoology department, Dr J. Warham, who has worked on the sub-Antarctic islands south of New Zealand, has the largest contribution in the book on the Crested penguins. He also contributes a colour photograph of erect-crested penguins which appears on the jacket of the book, numerous drawings illustrating penguin behaviour, photographs, and reproductions of sonograms of penguin calls.

Dr I. Spellerberg, now of the biology department at Southampton University, who worked on Antarctic birds and mammals for three seasons with the university's Antarctic unit, writes about the predators of penguins. Dr E. B. Spurr, who is now doing post-doctoral research in Scotland, writes about communication in the Adelie penguin after several seasons' research with the unit.

Dr G. W. Yeates, who now heads a soil biology research section in the Department of Scientific and Industrial Research, writes about micro-climate, climate, and breeding success in Antarctic penguins. He studied Adelie penguins with the unit while a Ph.D. student.

INTERNATIONAL SUPPORT FOR MUSEUM'S ANTARCTIC CENTRE

Britain, Norway, the United States, Australia, and the Soviet Union are among the nations involved in Antarctic research which have supported the Canterbury Museum's Antarctic centre in recent months. Relics of historic expeditions have come from survivors, and the international support has included a first instalment of $5500 from a fund-raising project initiated by Mr Lars-Eric Lindblad, of New York, who has been responsible for regular Antarctic tourist cruises in the Lindblad Explorer. Also the museum now has an assistant curator for its Antarctic collecions.

Mr Lindblad's contribution represents the proceeds of New Zealand sales of 100 signed prints of an Antarctic painting he commissioned from the marine artist, Keith Shackleton, a nephew of Sir Ernest Shackleton. Proceeds from the sale of another 650 prints in the United States are expected to increase the fund to $30,000.

Mr David Harrowfield, a 35-year-old senior technician in the geography department of the University of Canterbury, has been appointed assistant curator of Antarctic collections. Last month he began the selection and annotation of items illustrating Antarctic history for display in the historical section of the museum's Antarctic hall.

Mr Harrowfield became interested in archaeology as a schoolboy. He was an assistant to a senior boy at the same school, Michael Trotter, now the museum's geologist. Later he became a member of the museum's archaeological society, and is now treasurer of the New Zealand Archaeological Association.

Last season Mr Harrowfield worked at Cape Bird, Ross Island, as a field assistant with Dr Robert Kirk, a senior lecturer in geography, who took part in the University of Canterbury's summer research programme.

One of the last survivors of the Ross Sea Shore Party of Shackleton's Imperial Trans-Antarctic Expedition of 1914-17 is Mr Irvine Owen Gaze, of Melbourne, who is now 86. He has given to the museum his original field diary, and an album of annotated photographs. The other survivor, 81-year-old Mr R. W. Richards, also of Melbourne, who presented a transcript of his personal diary for the period from February 23 to March 19, 1916, has presented additional material of historic interest.

Pamphlets, mostly religious, were issued to members of Scott's 1901-1904 Discovery expedition before they went south. Some were salvaged when rubbish was cleared from the Discovery hut at Hut Point in 1957. They have been presented by Mr M. Sevier, who was a young supply officer with the United States Navy's task force in the International Geophysical Year, and retired this year to live in Christchurch.

When the Morning sailed from Lyttelton in 1902 on her first voyage she carried fresh New Zealand mutton for the Discovery party. Canterbury farmers contributed 100 sheep for the expedition, and Mrs J. F. Coates, grand-daughter of Mr F. W. O. Weymouth, secretary of the Canterbury Frozen Meat Company, has presented to the museum letters and accounts of the victualling of the Morning.

In the list are the names of the farmers who contributed the sheep, and original

letters from Sir Clements Markham, Captain Scott, and Captain W. Colbeck, master of the Morning. The Morning arrived in McMurdo Sound soon after Scott, Wilson, and Shackleton had returned from their southern journey. Doorly describes in his book, "In the Wake," how Wilson and Shackleton did extraordinary justice to the mutton and fresh potatoes the Morning had brought.

Other relics of Scott's first expedition are copies of the shipbuilders' plans of the Discovery. They have been presented by the National Maritime Museum, Greenwich.

In 1956 a service was held in the Christchurch Cathedral for Americans and New Zealanders who were going south. A 48-star United States flag was presented by Rear-Admiral George J. Dufek, commander of the United States naval support force. This year the flag was formally handed over to a museum representative at the memorial service for Americans and New Zealanders who have died in the Antarctic since 1946. Captain E. W. Van Reeth, the support force commander, presented a new 50-star flag to the cathedral authorities.

Soviet gifts to the museum include a medal struck by the Antarctic Committee of the Soviet Academy of Sciences to commemorate the 150th anniversary of the voyages to the Antarctic by Bellingshausen and his second-in-command, Lazarev, in the Mirny and the Vostok. The museum has also received the two-volume "Atlas of Antarctica," the first complete survey of the Antarctic Continent and the Southern Ocean.

A sub-Antarctic relic has also been added to the museum's collections. It is one of two earthenware crocks from a shipwreck depot of 1886 on Bounty Island. It was retrieved on May 20 this year by Lieutenant-Commander I. A. Hunter, R.N.Z.N., of H.M.N.Z.S. Canterbury.

THE READER WRITES

Sidelights of Antarctic Research

Letters, preferably not longer than 500 to 600 words, are invited from readers who have observed some little-known facet of Antarctic life or have reached conclusions of interest on some Antarctic problem — Editor

OVER AND UNDER

Sir,—Having spent the winter at McMurdo (Station) I did not see a copy of "Antarctic," March, 1975, until after the September "Winfly." The "over and under" letter in "The Reader Writes" column was food for thought. I have no opinion concerning over-use of Antarctic cliches, but I am unable to see how the alleged over-use of cliches does any harm or why it would upset anyone. I have spent four winters at McMurdo, and I have always thought of the term "winter-over" as strictly an American term. Perhaps it is a matter of semantics instead of cliches. I define winter-over as staying over the winter—over meaning a period of time such as overnight, etc., and not "above."

As a radio operator over to me means an invitation to transmit. So, as I said, it's a matter of semantics.

Yours,etc.,

RMC BILLY ACE BAKER, U.S.N.
McMurdo Station, Antarctica.

[After four winters Mr Baker obviously knows the meaning of winter-over. But in the days before semantics men usually wintered in the Antarctic.—Ed.]

SOUTH POLE FARM TRACTOR AND SNOCAT FOR MUSEUM

One of the three Ferguson farm tractors used by Sir Edmund Hillary and his party on their journey to the South Pole in 1957-58 is now being restored for display in the Antarctic centre of the Canterbury Museum. It has been in storage since it was brought back from the Antarctic in 1967.

After the New Zealanders reached the Pole on January 4, 1958, the three tractors were left there. Later one was shipped back to Britain, and the other is preserved in the Auckland Museum of Transport and Technology.

For two years the Canterbury Museum's tractor remained at the Pole, and was used by the men at the Amundsen-Scott South Pole Station. It established a reputation as the only station vehicle which could be relied upon to start without trouble in the winter.

Then the tractor was flown to McMurdo Station. It was used for the next seven or eight years by the United States Navy's VXE6 Squadron. In 1966 the curiosity of a member of the New Zealand Antarctic Society initiated a project to bring the tractor back to New Zealand.

THIRD TRACTOR

Mr B. N. Norris, honorary curator of Antarctic relics at the museum, knew what had happened to two of the tractors; he wondered what had happened to the third. He was told where it was by Lieutenant-Commander J. Morrison, of VXE6 Squadron.

In 1967 the tractor was flown back to Christchurch. Sir Edmund Hillary was able to identify it as one of the three Pole tractors by the fencing standards which had been welded on to it when it was virtually rebuilt at Scott Base, and early in 1968 it was formally handed over to the museum by Rear-Admiral J. Abbot, commander of the United States naval support force.

Since then the tractor has been stored by the Massey-Ferguson agents, C. B. Norwood Ltd, who have undertaken to restore it to its original condition. Mr Norris and another member of the Antarctic Society, Mr S. W. M. Smith, have been finding out all they can about the vehicle so that every detail will be correct.

Recently Sir Edmund Hillary and Mr Murray Ellis, engineer in the Pole party, visited Christchurch and inspected the tractor, which, like the other four presented to the expedition, was extensively modified in Britain, New Zealand, and the Antarctic. Both were able to give details of the original condition of the vehicle to assist in its restoration.

By the time the diesel mechanic, Mr J. G. Bates, and other ingenious New Zealanders had finished work on the tractors, they bore litle resemblance to the typical Model TE20 farm tractors produced by Massey-Ferguson Ltd. That is why the restoration team has sought further information from Mr Bates and the radio operator of the party, Mr Peter Mulgrew. Memories become a trifle dim after 18 years.

In spite of its gruelling 1250-mile journey to the Pole, and nearly 10 years of short trips in the Antarctic, the tractor is in fairly good condition. It still has its original tyres, but lacks a tow-bar and other fittings.

When the Antarctic centre is opened next year it will have on exhibition two vehicles which reached the South Pole, and one which also crossed the Antarctic Continent. The museum already has snocat Able, the command vehicle used by Sir Vivian Fuchs and his party on their 2158-mile journey.

Scott's happy memories of home on Clifton Hill

"They are dear good friends both to the expedition and even more to us," Edward Wilson wrote in the diary he kept on Scott's last expedition. These "dear good friends" were Joseph and Sara Kinsey, and to the officers and scientists of three Antarctic expeditions their home on Clifton Hill was indeed "The Breath of Heaven" or "Te Hau Ote Atua," the Maori name given to it by the Kinseys.

Sir Joseph Kinsey, as he became later, acted for Scott in the Discovery days, and for Shackleton in 1907. Scott wrote of him as a thoroughly shrewd businessman, which he was. He was also a kind and generous host to the expeditions for which he acted, and truly a good friend to all the young men who went south. And his wife became equally dear to those who enjoyed his hospitality.

Scott had the highest regard for Sir Joseph Kinsey. "His interest in the expedition is wonderful . . . His kindness to us was beyond words." And Wilson wrote: "He is one of the best in the world—a man to be trusted with everything in the world that one most values."

When the Terra Nova sailed south Scott and his wife had happy memories of the "The Breath of Heaven". "They spent four weeks there while the ship was at Lyttelton.

In his journal Scott wrote: "The house stands at the edge of the cliff, 400ft above the sea, and looks far over the Christchurch plains and the long northern beach which limits it; close beneath one is the harbour bar and winding estuary of the two small rivers, the Avon and Waimakariri (sic). Far away beyond the plains are the mountains, ever-changing their aspect, and yet farther in over the northern sweep of sea can be seen in clear weather the beautiful snow-capped peaks of the Kaikouras.

Clifton Hill and the scene Scott gazed on have changed in the last 65 years but "Te Hau Ote Atua" still stands in a street named after its owner—Kinsey Terrace. And the garden where Scott and his wife slept at night "under peaceful skies" is still there. In it are relics of the expedition.

There is an ice anchor from the Terra Nova, and many of the terraces are built from kenyte lava rocks brought back from Mount Erebus to Lyttelton as ballast. Kenyte rocks also border the garden paths.

Next to "Te Hau Ote Atua" is a small house which has an even closer association with Scott's last expedition. It was once a special hut designed and pre-fabricated in London for use at Cape Evans. But it was never used, and was brought back to Lyttelton in the Terra Nova.

Sir Joseph Kinsey bought the hut, which was erected next to his home, and used it as a smoking room. For more than 60 years it has been known as "The Cabin."

Later "The Cabin" was converted into a pleasant home, and was occupied for many years by Sir Joseph Kinsey's head gardener, Mr Harold Stemmer, whose descendants still live in Kinsey Terrace. And for some time Scott's Russian dog driver, Demitri Gerof, lived in "The Cabin" being employed as an assistant to Harold Stemmer.

Demitri, who was born in Sakhalin, in eastern Siberia, helped Cecil Meares to choose the expedition's sledge dogs. After the return of the expedition he worked for Sir Joseph Kinsey, went to England, and then returned to New Zealand where he stayed for some time before going back to Siberia.

In front of "The Cabin" is a frame for a grape vine. Once it was an exercise rail for dogs, and one of the most famous huskies in Antarctic history—the mighty leader, Osman—spent some time there under Demitri's care until he was sent to the Wellington Zoo.

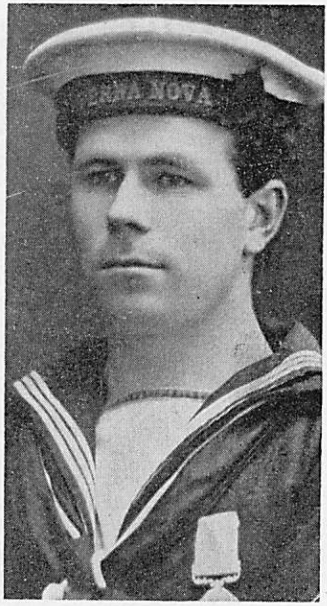
There was a great affection between Demitri and the leader of the team he had driven in the Antarctic. This is not surprising. Osman was the king of all the dogs with Scott's last expedition. "Our best sledge dog," according to Scott, and Cherry-Garrard described him as an aristocrat.

In New Zealand Osman was the fiercest dog of all. He almost did not reach Antarctica. When the Terra Nova was hit by a furious gale in the Screaming Sixties he was washed overboard, and saved by one of the seamen when carried aboard on the crest of the next wave.

Ponting says in "The Great White South" that the adventure seemed to have a sobering effect on Osman. He was gentle and good-natured—a sociable, docile animal. "With his massive build and magnificent head he looked every inch the chief he was."

One Antarctic relic in "The Cabin" for many years was a chair from Scott's cabin on the Terra Nova. He gave it to Mr J. F. Stanley, who worked for Sir Joseph Kinsey's shipping company when the ship was being lightened at Lyttelton in preparation for the voyage south.

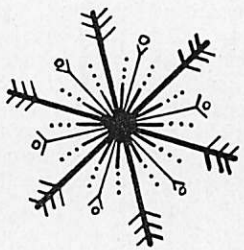
The chair and two other relics are now in the possession of the previous owner of the Kinsey property. One is a brass pocket compass which Captain Oates gave to Sir Joseph Kinsey's daughter as a keepsake.



DEMETRI GEROF

Perhaps most interesting of all is a bag of geological specimens left behind at Cape Evans by Edward Wilson. The bag began life as part of a tablecloth familiar to all who have seen the photographs in "The Great White South."

Sir Raymond Priestley, who served with Shackleton, and was with the Northern Party of Scotts last expedition identified the bag as having been made from the tablecloth used at Cape Evans for special occasions. It is the cloth shown in Pontings famous photograph of the first Midwinter's Day dinner, and was cut up when calico became short.



ANTARCTIC BOOKSHELF

FOOTPRINTS ON A FROZEN CONTINENT

By

John G. McPherson

Hicks, Smith and Sons Ltd.

152 pp. Two maps and 222 illustrations. N.Z. price $13.75.

Nature provided the stimulus to the great talents of Herbert Ponting, perhaps Antarctica's most famous "camera artists" (as he preferred to call himself), according to his biographer, H. J. P. Arnold. He says that Ponting strove after what the considered "felt" right and represented its mood.

Sixty-five years after Ponting photographed Scott's last expedition camera equipment and transportation have made the Antarctic photographer's task easier. Nevertheless, today's "camera artists" still requires the same attributes as Ponting.

"Footprints on a Frozen Continent" is principally a photographic book about the Ross Sea region of Antarctica. The text, some instructive diagrams, and a helpful map of the region are valuable adjuncts to a fine range of photographs, most of them taken by the author.

Dr McPherson is a New Zealand geologist who has spent two summer seasons on geological work in Antarctica with Victoria University of Wellington expeditions. In his second season he was deputy leader of the expedition.

The author's personal interpretation of a remarkable part of the earth's surface comes through clearly and sensitively in the photographs, the majority of them in colour. In addition there are 28 historical photographs which the author has obviously gone to some pains to obtain. Recent photographs of the historic huts at Hut Point, Cape Evans, and Cape Royds are interposed effectively.

Dr McPherson provides an objective, clear, and simple text. He has done careful research for his historical chapters, and he writes with authority on scientific matters in terms which can be readily understood by the layman. In particular there is an excellent section on the dry valleys of Victoria Land, and a geological appraisal—supported by some fascinating photographs and drawings—of Gondwanaland and the

The wildlife photographs also are superb. There is one magnificent scene of a hundred or so penguins on an ice floe in the blue Antarctic waters. And a photograph of the mighty Beardmore Glacier shows graphically why its ascent was such a terriflying ordeal to Shackleton, and Scott, and their parties. relationship of the continents.

Surprisingly, in a book which deals principally with the Ross Sea region Dr McPherson has summarised the activities of the Ross Sea Shore Party of Shackleton's expedition in two sentences. It would have been more appropriate to have included some material on the party, and omitted the Hurley photographs, which are widely known.

Nevertheless, Dr McPherson's fine photographs and lucid accompanying prose express admirably his feeling for the Antarctic environment, and the majesty and beauty of the continent. Paradoxically, the environmental aspect is presented more effectively because it is not emphasised unduly.

In fact, Dr McPherson says little about the adverse effects of man's intrusion on the Antarctic scene. He is content to present the natural beauty of the continent, and explain the worthwhile exploratory and scientific aspects of man's achievements there.

R.G.M.

RADIO ECHO SOUNDING MAP OF ANTARCTIC (90°E-180°)

By

David J. Drewry

"Polar Record", Volume 17, No. 109, 1975, pp 359-74.

This publication comprises three maps and a 14-page explantory text plus photographs and diagrams. Map 1 depicts the ice sheet surface relief; Map 2 the sub-ice relief; and Map 3 shows ice surface contours superimposed on sub-ice relief between approximately 90°E and 180.

The Scott Polar Research Institute, which produced these maps, has been a pioneer in the field of airborne radio echo soundings. The institute undertook its first long-range soundings of the Antarctic ice sheet in 1967, and carried out subsequent programmes in the summers of 1969-70, 1971-72, and 1974-75. In the text, the details of gathering and reducing data for the maps are outlined, and some comparisons are made between it and previously published Antarctic surface of sub-glacial maps. A final section deals with some of the glaciological and geological implications of the features depicted on the map.

Basically, the radio echo sounding equipment is used to determine both the height of the ice surface and the ice thickness. From this data at any one point the bedrock elevation beneath the ice can be determined. Map 1, which depicts the ice sheet surface relief, is of importance in comprehending the dynamics of the East Antarctic ice mass because surface topography controls to a large degree the principal characteristics of the ice flow pattern. In general and on a regional scale, ice flows at right angles to the surface contours.

Although ice flow lines have been constructed for portions of Antarctica before, the much greater precision obtained in constructing surface contours from radio echo sounding has led to a much more accurate knowledge of ice dynamics. Three separate centres of ice outflow can be recognised in the mapped area. It can be seen from the map that ice surface topography shows a certain degree of relationship to bedrock relief, which is to be expected.

The central and highest dome (4100m), for instance, lies over the highest measured portions of the sub-ice Gamburtsev Mountains. Surprisingly, however, the lowest of the three domes (3200m) is not strongly controlled by a nearby sub-glacial massif, although this mountainous area must have played an important part in the growth of the ice sheet.

The sub-ice bedrock topography is shown in considerably more detail on the radio echo sounding map than has been available on previous maps, e.g. in the Antarctic Map Folio Series published by the American Geographical Society. The Wilkes Subglacial Basin, for example, which trends parallel to but inland from the Transantarctic Mountains, is delineated in considerable detail.

It is now clear that it extends below sea level as far south as the catchment of the Byrd Glacier, beyond which it is terminated by a series of major upland blocks. Certain morphological elements can be recognised, particularly in the inland subglacial portion of the Queen Maud Mountains, where submerged mesas and tablelands with steep flanking escarpments are considered to result from the structural control of relief by the flat-lying Beacon Supergroup.

Only a few maps of Antarctica showing surface ice contours and sub-ice bedrock relief have so far been published. This latest map which is a considerable refinement on earlier attempts, thus provides a wealth of up-to-date data on sub-ice topography, ice thickness, and ice dynamics, and is well worth study by any with an interest in these fields.

M. G. LAIRD,
New Zealand Geological
Survey, Christchurch.

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Overseas subscribers are asked to ensure that their remittances are converted to New Zealand currency.

The New Zealand Antarctic Society (Inc.)

The New Zealand Antarctic Society was formed in 1933. It comprises New Zealanders and overseas friends, many of whom have seen Antarctica for themselves, and all of whom are vitally interested in some phase of Antarctic exploration, development, or research.

The society has taken an active part in restoring and maintaining the historic huts in the Ross Dependency, and plans to co-operate in securing suitable locations as repositories of Polar material of unique interest.

There are two branches of the society and functions are arranged throughout the year.

You are invited to become a member, South Island residents should write to the Canterbury secretary, North Islanders should write to the Wellington secretary, and overseas residents to the secretary of the New Zealand Society. For addresses see below. The yearly membership fee is NZ$3.00 (or equivalent local currency). Membership fee, including "Antarctic", NZ$5.00.

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