ANTARCTIC

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Scott Base now has kennels to house its huskies in the winter months. This time exposure shows the winter dog lines on the ice, and the 200-watt lights turned on to provide light at feeding time in the Antarctic winter darkness.
Antarctic Division, D.S.I.R. photo

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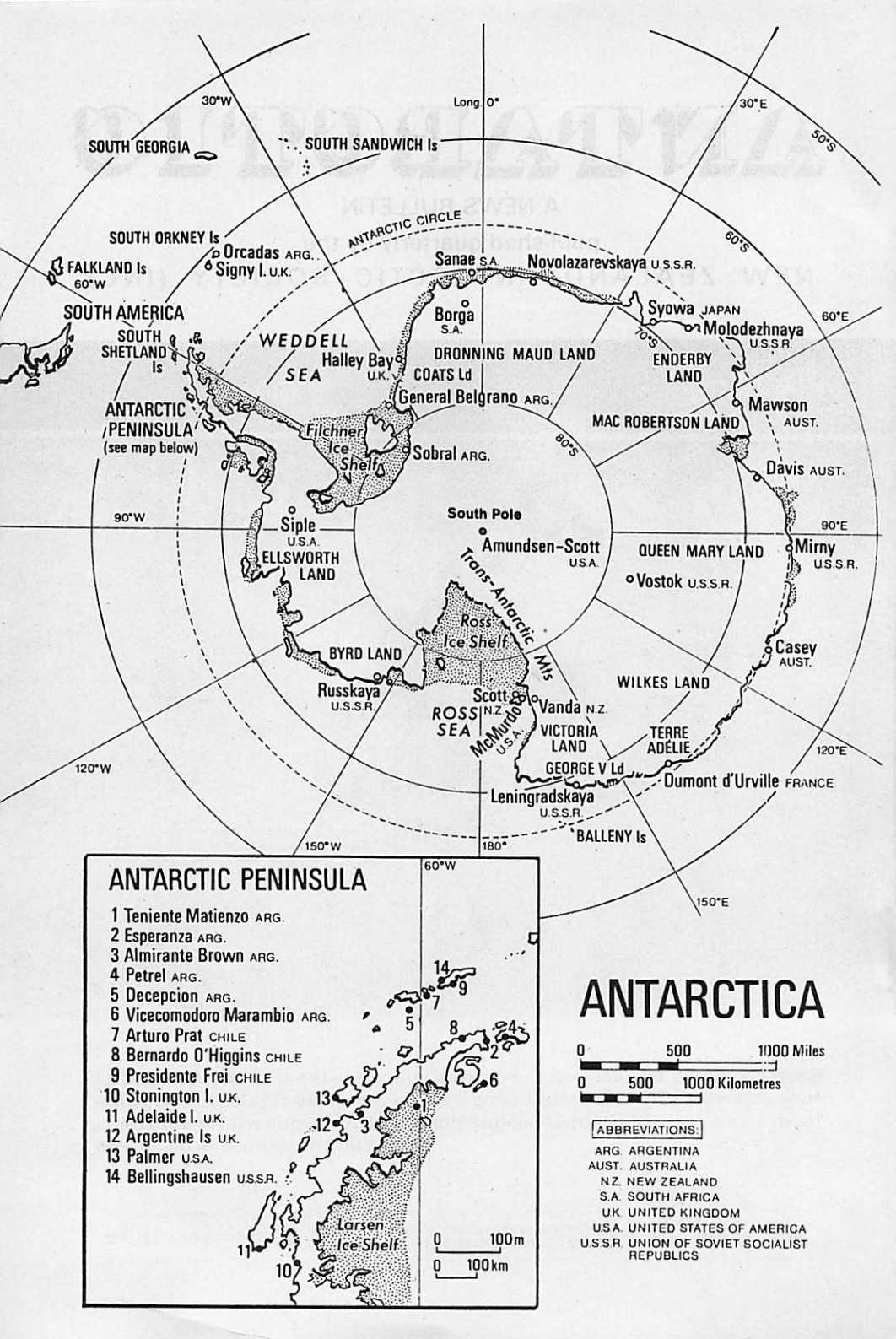
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30°E
50°S
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SOUTH SANDWICH Is
SOUTH ORKNEY Is
Orcadas ARG.
Signy I. U.K.
ANTARCTIC CIRCLE
60°S
FALKLAND Is
60°W
Sanae S.A.
Novolazarevskaya U.S.S.R.
SOUTH AMERICA
Borga S.A.
Syowa JAPAN
Molodezhnaya U.S.S.R.
60°E
SOUTH SHETLAND Is
WEDDELL SEA
Halley Bay U.K.
DRONNING MAUD LAND
COATS Ld
70°S
ENDERBY LAND
General Belgrano ARG.
ANTARCTIC PENINSULA
(see map below)
Filchner Ice Shelf
Sobral ARG.
MAC ROBERTSON LAND
Mawson AUST.
80°S
Davis AUST.
90°W
South Pole
90°E
Siple U.S.A.
Amundsen-Scott U.S.A.
ELLSWORTH LAND
QUEEN MARY LAND
Mirny U.S.S.R.
Vostok U.S.S.R.
Trans-Antarctic Mts
Ross Ice Shelf
BYRD LAND
Casey AUST.
WILKES LAND
Russkaya U.S.S.R.
Scott N.Z.
Vanda N.Z.
ROSS SEA
McMurdo U.S.A.
VICTORIA LAND
TERRE ADÉLIE
120°W
120°E
GEORGE V Ld
Dumont d'Urville FRANCE
Leningradskaya U.S.S.R.
BALLENY Is
150°W
180°
150°E
ANTARCTIC PENINSULA
60°W
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.
Larsen Ice Shelf
0 100m
0 100km
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"

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CONTENTS

This month 14 men died in Antarctica, 11 from the Argentine and three from Britain. In the past relations between Britain and the Argentine about their Antarctic interests have been strained at times.

But national differences do not concern those who share the same hostile environment and its dangers. As on other occasions men from the Antarctic bases of both countries, and the United States, disregarded danger in the search for the 14 who died in air and mountain accidents.

Economic pressures could impose strains in the special relationship of nations involved in Antarctica. They are not likely to weaken human relationships.

NEW ZEALAND PART IN ICE SHELF PROJECT

New Zealand marine biologists and oceanographers will work with United States scientists in the Ross Sea, and on the Ross Ice Shelf Project this season. This is the major international project in the New Zealand Antarctic research programme for 1976-77, but support will be given to French, Italian, and Japanese parties which will work on Ross Island, and in Victoria Land.

Because of economic constraints the normal scientific programme will not be run from Vanda Station this summer. The station will be occupied only for short periods to provide operational support for the Italian and Japanese parties working in the dry valleys, and other parties in the area. There have been other cutbacks — the withdrawal of Geological Survey and Soil Bureau field parties, and the cancellation of the Ministry of Works glaciological and hydrological studies in the dry valleys. But these are not expected to affect the complete research programme to any marked degree as most of the work is of a continuing nature.

One feature of this summer's programme will be the erection of a two-storey pre-fabricated accommodation block at Scott Base — the first new building for a number of years. Erection of the new building, which will house up to 35 people in summer, and include laboratory and storage space, will be the first step in the planned replacement of the buildings which have been there since the base was established in 1957.

In January a combined Ministry of Works and New Zealand Army construction team will fly south to work on the new building. Similar teams built Scott Base, and made major alterations and additions to the complex in the summers of 1959-60 and 1962-63.

New Zealand scientists were to have taken part in the third year of field work in the Ross Ice Shelf Project. Last season, but budgetary constraints and reduced air support forced the National Science Foundation to defer nearly all the field activities until this season. Field work this season will include drilling through the ice shelf to allow investigations of the shelf ice, water, possible life beneath the shelf, and sea bottom sediments.

BENTHIC STUDIES

Three scientists from the New Zealand Oceanographic Institute will be attached to R.I.S.P. Dr E. Barnes will take temperature measurements at varying depths down the drill hole, Dr Janet Bradford will sample pelagic Copepods from the hole, and Dr W.E. Whitley will carry out benthic biota studies of echinoderms etc. on the sea floor under the ice shelf.

Another scientist from the Oceanographic Institute, Dr G. Glasby, will spend three weeks on a United States Coast Guard icebreaker in the Ross Sea to carry out a regional sediment sampling programme. He will be asisted by Mr A. Hull, an honours student from Victoria University of Wellington.

French vulcanologists will work with New Zealanders on Mt. Erebus again this season. One of the world's foremost vulcanologists, Dr Haroun Tazieff, who worked on Erebus in the 1974-75 season, and three other scientists will spend up to three weeks monitoring volcanic activity. Attempts will be made to analyse gases from the inner crater, and

a map of the inner crater will be completed. Field leader of the party will be Mr C.C. Monteath, field operations officer, Antarctic Division, who worked on Erebus last season. A Lands and Survey Department surveyor, Mr J.D. Palmer, will do the mapping work for the Antarctic Division.

ITALIAN PARTY

New Zealand support will also be provided for the Italian and Japanese parties which will work in the dry valleys during the summer. A party of four Italians led by Dr C. Stochinno, a physicist and meteorologist, will spend six weeks in the dry valleys and on Mt. Lister in the Royal Society Range studying the geology and micro-meteorology of the areas.

This will be the third time an Italian party has joined the New Zealand research programme. Dr Stocchine's colleagues are Captain E. Rossi (meteorologist-cartographer), I. de Menno (technician), and W. Bonatti (guide). They will have the support of a D.S.I.R. field assistant.

Some New Zealand support will be provided to a four-man Japanese party led by Dr T. Torii, which will work in the dry valleys. Other members of the party are Dr Y. Suzuki, and Messrs Y. Tanaka and G. Matsumoto. Japanese scientists, and particularly Dr Torii, have worked in the dry valleys for several seasons in co-operation with the New Zealand research programme.

New Zealand will co-operate with the United States in the meteorological programme at the Amundsen-Scott South Pole Station for the second year. Two men will spend a complete year at the Pole conducting routine upper air and surface observations, and a third will work there for the summer.

Scientists from four universities will be involved in events in this year's programme. Men and women from the universities, Antarctic Division, Ministry of Works, Lands and Survey Department, Oceanographic Institute, and the Physics and Engineering Laboratory, will work on geological and glaciological projects in the dry valleys, biological and marine studies in the McMurdo Sound area, and on the Ross Ice Shelf, and a joint upper atmosphere project with the United States at Siple Station in Ellsworth Land. The Universities of Alaska and California will be involved in New Zealand upper atmosphere research at Scott Base and Arrival Heights.

RADIO "NOISE"

Since mechanised transport replaced dog teams engine noises have disturbed the Antarctic silence at bases. This season men from the Physics and Engineering Laboratory, and Scott Base staff, will be concerned with another kind of noise. They will attempt to locate, isolate, and reduce radio "noise" which at present seriously affects field party communications. This project is expected to be completed early in the summer season so as to minimise the relaying of field party messages.

New Zealand will join with the United States again to provide the logistic support required for their respective programmes. The main contribution will be seven flights by Royal New Zealand Air Force Hercules aircraft of No. 40 Squadron between New Zealand and Antarctica. Air crews and load planners will be provided, and also Army cargo handlers who will work at Williams Field near McMurdo Station.

Coarses in basic snowcraft and survival techniques will be provided as in past seasons for United States Navy air crews, United States Coast Guard icebreaker crews, and American and New Zealand research staff. The courses will be conducted by two mountaineers from the Antarctic Division's field staff, and two R.N.Z.A.F. physical training instructors, and a Royal New Zealand Army Medical Corps sergeant will assist in training the No. 40 Squadron air crews, and also learn skills for cold weather training of air crews within New Zealand.

WINTER TEAM AT SCOTT BASE

This season there will be a New Zealand Army officer as leader at Scott Base again, but only for the summer. He is Captain K.A. Tasker, aged 49, of the Royal New Zealand Electrical and Mechanical Engineers. Before his appointment he commanded infantry workshops in Christchurch.

Captain Tasker, who has had 25 years service, will be the fourth Army officer to be in charge at Scott Base. The first was Lieutenant-Colonel R.A. Tinker in 1963, the second was Major J.R.M. Barker (1972) and the third Major P.G. Frazer (1973). These three all wintered at the base.

Ten men have been selected to winter at Scott Base through 1977. Two men have wintered there before. They are Messrs J.S. Rankin (1971) and K.M. Weatherall (1972). Messrs G.N. Money and R.W. Wills worked with the 1974-75 summer support staff.

Eight members of the team are New Zealand-born; the others come from England and Scotland originally. There are three 21-year-olds, and other ages range from 22 to 45. This time South Islanders outnumber the North Islanders by seven to three.

Members of the winter team are:

J.S. Rankin (45), Kumara. Base engineer. He is service manager for Greymouth Motors.

I.J. Booker (21), Nelson. Fitter-mechanic. He is a fitter and turner for the Ministry of Works and Development.

H.F. Richards (21), Taupo. Fitter-electrician. He is an electrician in the Christchurch Municipal Electricity Department.

K.M. Weatherall (25), Milton. Senior science technician. He is a radio and TV technician.

P.J. Doherty (22), Christchurch. Science technician. He is a Glasgow-born TV technician employed by TV2.

R.D. Fearn (25), Auckland. Science technician. He is an English-born telecommunications technician.

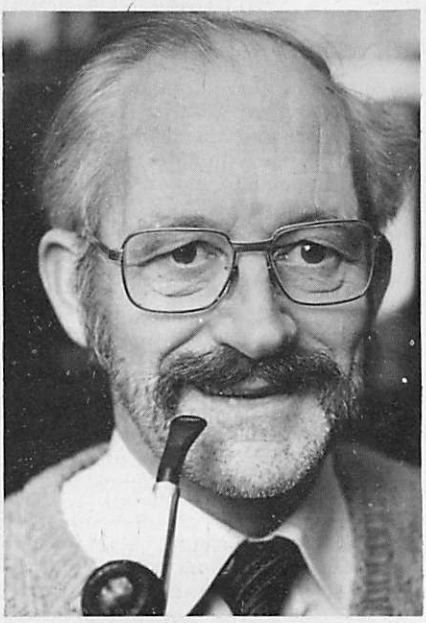
R. Keizer (21), Wakefield. Cook. He is a Royal New Zealand Navy chef.

I.D. Johnstone (25), Taihape. Postmaster. He is a Post Office supervisor.

G.N. Money (27), Christchurch. Post Office radio technician.

R.W. Wills (26), Christchurch. Field assistant-dog handler. A former alpine guide.

A 28-year-old Health Department publications officer, Miss Robin Ormerod, is the first woman to be appointed to the summer support staff at Scott Base. She will be the information officer this season.



CAPTAIN TASKER

Field Projects for Summer

New Zealand oceanographers will work on the Ross Ice Shelf and in the Ross Sea this season, and meteorologists will work again at the Amundsen-Scott South Pole Station. They are members of the support staff of more than 120, including seven women, who will be involved in the Antarctic research programme during the 1976-77 season. Research will be conducted by scientists from four New Zealand universities, and the programme will draw on staff from the Antarctic Division, Department of Scientific and Industrial Research, the Oceanographic Institute, Physics and Engineering Laboratory, the Meteorological Service, Ministry of Works and Development, Lands and Survey Department, and the Post Office. The programme will also include guest scientists from France, Japan, and Italy, and men and women from England, Scotland, and Australia.

These men and women will work at or from Scott Base, Cape Bird, in the dry valleys of Victoria Land, on White Island, and in McMurdo Sound. New Zealanders will work with the Americans at the South Pole, on a joint upper atmosphere programme at Siple Station in Ellsworth Land, and on the Ross Ice Shelf. They will also work with the French on Mt. Erebus, and with the Japanese and Italians in the dry valleys. One small party will work at Carapace Nunatak, which is 200km north-west of Scott Base.

One of the main field events will be the Ross Ice Shelf Project, an international project initiated by the United States, which involved scientists of several nations. Drilling will be done through the ice shelf, and New Zealand marine biologists and oceanographers will take part in investigations of the shelf ice, of the water and possible life beneath the shelf, and of the sea bottom sediments.

Vanda Station, in the Wright Valley, which has been a summer station since 1970, was occupied in the winter of 1974, and used for summer operations only last season. This season it will be occupied for short periods during the summer for maintenance and operational purposes.

A major contribution to future programmes will be made this season by the Army. It will send a construction team south in January to erect a prefabricated accommodation block at Scott Base, a project in which the Ministry of Works and Development will also be involved. The Royal New Zealand Air Force and the Royal New Zealand Army Medical Corps will contribute to the snowcraft and survival training courses during the summer.

There will be a woman technician, Miss Thelma Rodgers, from the Physica and Engineering Laboratory at Scott Base this summer. Two biologists, Misses Vicky Cameton and Debbie Teale will study the parasitology of Weddell Seals with the University of Otago biology team, and Miss Elspeth Wingham will work with the University of Canterbury party in studies of an isolated seal colony on White Island.

Last season Mrs Margaret Bradshaw spent four weeks in the field collecting geological specimens in Southern Victoria Land for the Canterbury Museum's new Antarctic centre. This season Mrs Bradshaw, who is the museum's geologist, will complete her programme. With a field assistant she will spend six weeks at Carapace

Nunatak, Mt Crean, Allan and Coomb Hills, and Mt Fleming.

When Dr Janet Bradford, of the Oceanographic Institute, flies to the Ross Ice Shelf in December she and her colleagues will be further from Scott Base than any other field party this summer. She will be attached to the Ross Ice Shelf Project for several weeks, and will study marine life from the drill hole through the ice shelf into the sea floor.

Continuing research programmes at Scott Base include meteorology, geomagnetism, ionospheric physics, and seismology. Research will also be continued at Arrival Heights into geomagnetism and the aurora. This season scientists from the Universities of California and Alaska will work at Scott Base with the New Zealanders.

Each season since 1961-62 representatives of New Zealand youth organisations have spent several weeks in the Antarctic, and assisted in the research programme at Scott Base. In late December three youths, representing the Scout Association, St John Ambulance Association, and the Boys' Brigade, will travel south in a United States icebreaker. They will work at Scott Base and take part in short field trips before returning to New Zealand in the icebreaker.

SCOTT BASE

John Charles. Deputy leader. He is 34, and a senior ranger with the Arthur's Pass National Park Board.

L.P. Livingstone, Auckland. Maintenance officer — carpenter.

G.C. McKirdy, Lower Hutt. Assistant maintenance officer.

P.W. Cotton, Nelson. Assistant maintenance officer.

L.C. Bennett, Ashburton. Assistant maintenance officer.

B.M. Nissen, Waiouru. Storekeeper.

R.A. Ormerod, Wellington. Information officer-photographer.

P.C. Carrington, Levin. Post Office clerk.

T.S. Leota, Wellington. Post Office clerk.

M.A. Caves, Wellington. Post Office radio technician.

H.N. Dengate, Christchurch. Field assistant.

D.C. Thompson, Wellington. Meteorological Service.

C.A. Roper, Christchurch. Technician, Physical Engineering Laboratory.

T.A. Rodgers, Christchurch. Technician, Physical and Engineering Laboratory.

N. Linton-Smith, Melbourne. ANARE field officer.

R.L. Park, Christchurch. Post Office senior rigger.

J.A. McGregor, Christchurch. Post Office lineman.

University projects are outlined elsewhere. Other projects and the participants are:

Antarctic Division. Continuation of monitoring of McMurdo Ice Shelf movement, supported by two surveyors from the Lands and Survey Department. Annual population studies of the Weddell seal population in the McMurdo Sound-Ross Island region, and of the Adelie penguin population at Cape Royds will be continued. Any banded Adelies sighted will be recorded. Snowcraft and survival training for United States and New Zealand staff. S.B. Allan (field leader), G.I. Ball (field assistant), K.R. Briscoe, B. Beveridge (R.N.Z.A.F.), E.D. McLeod (R.N.Z. Army Medical Corps).

Antarctic Division, Victoria University of Wellington, and University of Canterbury. Physiological and psychological studies of winter teams at Scott Base (1976 and 1977). Professor A.J.W. Taylor, professor of clinical psychology, Victoria University

of Wellington, Professor R.A.M. Gregson, Dr A.F. Barabasz, J. Barton (technician), psychology department, University of Canterbury.

Scott Base staff will continue an aluminium corrosion project which was begun for the University of Cantebury in the 1974-75 season. They will also continue for the University of Auckland the operation of an electrostatic field mill which measures and records hourly the electric field in the air above the earth's surface.

Physics and Engineering Laboratory. Continuation of upper atmosphere studies, aurora and air glow, earth currents, geomagnetism, and recording of ionspheric absorption at Arrival Heights with University of California. Messrs G. Lewis and A.H. Allen, with Scott Base staff, will attempt to locate and reduce radio noise affecting field party communications. Two technicians, Messrs R.G. Brown and J.E. Dyer, will fly to Siple Station to reinstall and check the LEDA project VLF radio receiving equipment for the joint United States-New Zealand upper atmosphere programme.

Meterological Service. Upper air and surface observation programmes at Amundsen-Scott South Pole Station L.J. Anderson (winter), A.M. Quayle (summer). Routinuation of routine daily climatological observations.

Geophysics Division, D.S.I.R. Seismological programme at Scott Base will be continued.

Institute of Nuclear Sciences. Continuation of monitoring programme by technical staff at Scott Base to determine increase in carbon dioxide in the atmosphere.

Canterbury Museum. Dr M. Bradshaw, the museum's geologist, and an Antarctic Division field assistant, J.M. Nankervis, will complete the collection of geological specimens for future display in the museum's Antarctic centre.

International Projects Dr H. Tasieff and three other French scientists with C.C. Monteath (field leader) and J.D. Palmer (surveyor) will monitor volcanic activity on Mt Erebus.

A Japanese Antarctic Research Expedition party will work in the dry valleys with New Zealand support. Dr T. Torii (leader), Dr Y. Suzuki, Y. Tanaka, G. Matsumoto. New Zealand will provide a field assistant to support an Italian party in the dry valleys and the Royal Society Range. Dr C. Stochinno (leader), Captain E. Rossi, I. de Menno, W. Bonatti.

Staff from the University of Alaska Geophysical Institute will complete the installation and begin the operation of infrasonic wave receiving and recording equipment at Scott Base.

Collection of air samples from aircraft flying to and in the Antarctic for the Commonwealth Scientific and Industrial Research Organisation.

Ministry of Works and Army. Scott Base accommodation block construction. V.G. Erridge (M.O.W. supervisor), S. Heaton, C.J. Oliver, K.T. Rikihana, A.D. Stockwell, D.R. Pugh, M.P. Payne, G.L. Stack, R.M. James, M.S. Beal, G.Pullen, W.A. Noah (Army construction team, Burnham).

The Australian Base

Casey, recorded minus 41deg Celsius — its lowest temperature ever — on July 18. Records were started in 1957 at what was then the United States Wilkes Station.

(Australia took over administrative control of Wilkes in 1959, and transferred operations in 1969 to the new station Casey, built nearby.)

Survey of Fry Glacier by University Party

A geological reconnaisance of the previously unexplored Fry Glacier, 170km north-west of Scott Base, is one of the main projects which will be carried out by university scientists during the New Zealand Antarctic research programme this summer. Four universities — Waikato, Victoria, Canterbury, and Otago — will contribute teams to this season's programme. Field parties will study an isolated Weddell seal colony on White Island inMcMurdo Sound, make the annual census of the penguins on Ross Island, and explore the possibility of recent volcanic activity around Mts. Discovery and Morning. Some scientists will continue the work done for several seasons in the ice-free valleys west of Scott Base in Victoria Land.

This summer the seven members of Victoria University's 21st expedition will be divided into two teams. One led by Dr C. Burgess will be flown by United States Navy helicopter to the head of the Fry Glacier; the other, led by J.R. Keys, will work in the ice-free Taylor Valley, and around Mts Discovery and Morning. Both will be supported by field assistants from the Antarctic Division, D.S.I.R.

The Fry Glacier area lies between the Mackay and Mawson Glaciers. It has extensive snow and ice-free areas, but has not been geologically mapped, even at reconnaissance level, since it was first charted by Shackleton's expedition of 1907-09.

Aerial photographs indicated well-exposed sections of Beacon sandstone. One of the major Beacon problems relates to the disappearance of thick Devonian quartz sandstone between Mt Gran and the area north of the Mawson Glacier. The strata in the intervening Fry Glacier should contain some indication of the reason. The dry valleys at the head of the Fry Glacier are protected from plateau ice by the north-south trending Convoy Range to the west. At present no plateau ice enters them, and consequently the glacial deposits there may be much older than those exposed in the dry valleys further south.

SLEDGE JOURNEY

In the second week of November the Fry Glacier team, which includes A. Palmer and J.M. Anderson (geologists), and K.R. Sullivan (field assistant) will sledge across McMurdo Sound to Marble Point, and then will be flown to the head of the glacier. Then it will move by toboggan for several days, working out of each camp. Towards the end of December a botanist, A.J. Frost, will replace Dr Burgess, and continue his moss studies in the Towle and Northwind Valleys. The party will then work in detail in the Towle Valley until it is picked up early in January.

Before he goes to the Towle and Northwind Valleys Frost will make a quantitative study of the ecology and moss in the McMurdo Sound region.

Numerous moss localities have been mapped and sampled, especially on sub-Antarctic island, but there is still work to be done on the ecology of Antarctic species. An American botanist, E.D. Rudolf, studied vegetation near Cape Mallett in 1963, but like most of the research his work was mainly on lichens. Therefore Ross Island, almost 100km to the south, has been chosen for this season's project.

Led by Keys, a Ph.D. chemistry student, who is making his fourth visit to Antarctic, the other V.U.W. party, P.H. Robinson, T.A. Stern (geologists), and J.M. Nankervis (field assistant) will study debris layers within the upper Taylor Valley glacial ice, and measure other physical and chemical characteristics of the Taylor Glacier, and associated soils.

ICE THICKNESS

In October and November Robinson and Keys will measure ice thickness, temperature gradients, and rates of ice movement, and trace salt and debris layers in the Taylor Glacier. A D.S.I.R. surveyor, W.F. Wicks, will help in the study of the ablation rate at the surface of the Taylor Glacier. Last season a network of flagged poles was installed near the snout of the glacier to determine the lateral and vertical movement. These poles will be resurveyed to measure any movement that has taken place.

Glacial and salt studies in the Taylor Glacier area include an investigation of the processes of debris entrainment and the formation of debris layers with glacial ice. The purpose is to determine whether the change in the mode of till deposition around glaciers such as the Taylor Glacier results from a change in the dynamic and thermal conditions of a body of ice. Entrainment, transport, and deposition have not been studied in polar areas, and the debris bands in the Taylor Glacier are an ideal study area.

Soil and surface measurements on dark surfaces will be continued at chosen localities. Mineral and salt studies have been made in the dry valleys for the last three seasons to obtain a general picture of the surface salt distribution, and the processes which cause distribution. Further sampling will be done to trace the saline and hydrated iron oxide deposits at the snout of the Taylor Glacier.

SALT FORMATION

In late November and December Keys and Stern will work on the summit area and the upper northern slopes of Mt Discovery to examine the possibility of recent volcanic activity and salt formation around Mts. Discovery and Morning. They will leave the area towards the end of December.

Three large features up to 20m high were seen recently on aerial photographs of the summit ice-cap of Mt. Discovery, and on an area on the northern rim of a caldera (collapsed crater) west of the summit caldera of Mt. Morning. They appear to be similar to features found in places in Marie Byrd Land volcanoes, and attributed to present-day fumarole activity on these old volcanic piles. It is possible that these features, called snow hummocks by Dr L.J. Harrington, who reported them in 1959, may be of a different origin.

The age of volcanic activity of Mts. Discovery and Morning is significant. Volcanic activity introduces salt into the atmosphere, and on to the ground. This origin could no longer be neglected if the two volcanoes were proved to be still active since three volcanoes would have been producing salt in recent time (Mt. Erebus has produced localised salt deposits). The origin of tephras (ash layers) found in ice at several places in South Victoria Land may have to be reconsidered if Mt. Morning is found to be still active.

The snow-ice of these features should contain relatively high amounts of sulphur-containing ions, and the distinctive chemistry of originating from fumarolic vapours. Detailed examination of the structure of these features inside and out is needed.

This season the University of Canterbury's biological research unit will be at full strength. Last season

because of the reduced New Zealand programme only two of its original five members went south. The 15th expedition's main project will be a study of an isolated Weddell seal population at White Island which the research unit has kept under observation for several seasons.

This seal population, as far as can be determined, has no contact with other seal populations in McMurdo Sound, and unlike them remains there in winter, maintaining breathing holes in the pressure ridges. The seals are in extremely good condition, which indicates an abundant food supply under shelf ice some considerable distance from the open sea. The presence of this population and the breathing holes that they maintain provide an excellent opportunity to study food chain relationships under permanent shelf ice.

Objectives of the project will be to monitor seal numbers and movements near White Island, to study the food chain relationships in the water column beneath the ice, to sample the local benthic community, and to obtain an estimate of the fish populations in the area, and their feeding habits. If possible all seals will be marked and measured.

BIOLOGICAL WORK

Professor G.A. Knox, head of the zoology department, University of Canterbury, will lead the expedition, and will spend three weeks at White Island. The field leader will be T. Carryer, who has previously spent two seasons working on the plankton under the shelf ice in McMurdo Sound. The other zoologists in the party are Miss Elspeth Wingham, B.J. Zurr, and Z.F. Williams.

Carryer will fly south next month to start the project before the seals begin pupping. He will travel to White Island by dog sledge, and will be supported by R. Wills, a D.S.I.R. field assistant, who will be the dog handler at Scott Base next season. They will set up a more permanent camp for the arrival of the rest of the party early in November.

Two zoologists, B. Warburton and N.M. Henderson, will continue the research unit's biological studies at Cape Bird this season. They will fly south towards the end of November, and will occupy the station for three to four weeks. During that time they will carry out the annual census of the penguin colonies, record banded penguins and skuas, and record and map the territories of breeding pairs of skuas. They will also carry out station maintenance.

SEAL PARASITES

This season two projects involving staff and students from the University of Otago have been included in the New Zealand research programme. A biology team led by Dr D.W. Featherston, of the department of zoology, assisted by Misses Vicki Cameron and Debbie Teale will continue the study of the parasites which have their adult stages in the Weddell seal. This will be Dr Featherston's fourth visit to the Antarctic.

Last season Dr Featherston and Miss Cameron were able to identify some of the intermediate larval stages from the life cycle of tapeworms which infect the gut and bile duct of the Weddell seal. These intermediate stages were found in am amphipod *(Paramoera walkeri)*, which is found in shallow waters and attached in crevices on the underneath surface of sea ice, and a notothenid fish *(Trematomus borchgrevinki)*, also associated with the underneath surface of sea ice.

As there are four different species of tapeworm involved, the programme this year will be directed at identifying these species. Since there are no facilities for obtaining and holding parasite free hosts, techniques of *in vitro* culture will be used in an attempt to grow the larval stages.

Studies will also be continued on fish to determine the prevalence of parasites in the different species. Material for this study will be collected through a hole

drilled in the sea ice. The water surface in the hole will be kept ice free by placing a specially designed hut with a hole in the floor over the ice hole and raising the air temperature in the hut to between 30-32 deg. by means of an oil burner. Fish are caught in traps or hooked on baited lines suspended at various depths.

A joint New Zealand and United States microbiological study of the resistance to infection of isolated groups working in Antarctica will be continued this season. Mr A. Parkinson, of the Otago University department of microbiology, and his wife, Ania, will continue studies on virus infections from the upper respiratory tract. The project was initiated by Dr H.G. Muchmore, of the Oklahoma University Medical School, and the winter parties at Scott Base and the Amundsen-Scott South Pole Station, co-operate in it. Mr and Mrs Parkinson will collect blood samples from men at Pole Station, and in the McMurdo Sound area during October, November, and January.

Antarctic Books Fetch High Prices

Antarctic literature of the Heroic Age and earlier is now beginning to attract the attention of book collectors and those who see rare books as a new avenue of investment. A collection of Antarctic books, letters, and maps realised more than $NZ5000 at an auction sale in Wellington recently.

For the two volumes of Sir James Clark Ross's "A Voyage of Discovery and Research in the Southern and Antarctic Regions during the years 1839-43", first published in 1847, the sum of $400 was paid. It was signed by the author, and bore in several places the signature of David Lyall, assistant surgeon on the expedition ship Terror.

A second edition of James Weddell's account of his voyage towards the South Pole performed in the years 1822-24 brought $300. This edition, published in 1827, also contains observations on the probability of reaching the South Pole, and an account of a second voyage performed by the cutter Beaufoy to the same seas. Matthew Brisbane, master of the Beaufoy, accompanied Weddell to the South Orkney Islands in January, 1823, and roughly charted the south coast of the group.

Scott and Shackleton material was keenly sought by buyers, but the third highest price of the sale was $300 for the two volumes of Sir Douglas Mawson's "The Home of the Blizzard", the story of the Australasian Antarctic Expedition of 1911-14. There was spirited bidding for "With the Aurora" by John King Davis, who commanded the Aurora on Mawson's expedition, and also when it rescued the survivors of the Ross Sea Party of Shackleton's 1914-17 expedition. It went for $165.

Roald Amundsen's two-volume account of his expedition was sold for $150. "The Voyage of the Discovery" in the familiar Macmillan's Colonial Library series brought $26, but the two volumes of the 1905 first edition (second impression) presented by the Lords Commissioners of the Admiralty as an examination prize to a naval cadet, Edward G.H. Bellars, in 1911, was sold for $180.

Probably because of their association with Teddy Evans, the two volumes of the first edition of "Scott's Last Expedition" brought $280. The fly leaf bore a sketch in green ink of the Terra Nova, an ice floe, and penguins, and was signed "Edward R.G.R. Evans, 1914". Another sketch, initialled by Evans, was of a horse's head captioned "also for racing on the Great Ice Barrier".

Aeneas Mackintosh's copy of "The Heart of the Antarctic" was sold for $180. It was inscribed "To A.E. Mackintosh from the author in remembrance of the

days together, and his help to the Expedition, October, 1909." Mackintosh was second officer of the Aurora in 1908-1909, and captain of the ship in 1914-15, and leader of the Ross Sea Party, 1915-16. He was lost when crossing sea ice early in May, 1916.

A printed pictorial menu of a welcome home dinner to "Lieutenant E.H. Shackleton and his Comrades, June 29, 1909, Princes Restaurant", was sold for $50, probably because it was autographed by Shackleton and 10 members of his first expedition — Sir Philip Brocklehurst, Frank Wild, Mackintosh, Bernard C. Day, Raymond E. Priestly, B. Armytage, George Marston, Eric S. Marshall, Ernest Joyce, and J.B. Adams.

In addition the menu was illustrated by the expedition's artist, George Marston. The scenes were entitles "Goodbye to Southern Party, Return of Southern Party, the Winter Quarters, and Ships at Sea".

Most of the stocks of "Antarctic Adventure", the story of Scott's Northern party, by Sir Raymond Priestly, were destroyed during the First World War. One of the comparatively rare copies of the first edition was sold for $120. The book was reprinted recently, and costs about $15.

Jean Charcot's account of his second expedition (1908-10), "The Voyage of the Why Not?" brought $105, but books by lesser-known figures in Antarctic exploration did not command high prices. "The Cruise of the Antarctic" by H.J. Bull was sold for $75, and copies of C.E. Borchgrevink's "First on the Antarctic Continent" brought $60 and $40. L.C. Bernacchi's account of his experiences as physicist with the expedition to Cape Adare, "To the South Polar Regions", went for $40.

Work on Historic Huts

A young Englishman who has climbed in Iceland, Norway, Austria, and the Pyrenees, will be one of the New Zealand Antarctic Society's two caretakers for the historic huts on Ross Island this season.

Mr Jeremy Sutton-Pratt, who was nominated by the Wellington branch of the Society, will fly south in December to work with the Canterbury branch nominee, Mr A.W. Burton.

Mr Sutton-Pratt is a traffic officer with the National Airways Corporation and has been in New Zealand for two years and a half, and belonged to the Surrey Mountaineering Club in England. He is a member of the committee of the Wellington branch of the Antarctic Society.

Mr Burton, who is an engineer, was selected as a hut caretaker last season, but the project was cancelled when the New Zealand research programme was reduced because of lack of air transport. Mr Sutton-Pratt has replaced Mr P.G. Poppleton, who was unable to go south this season.

Except for last season, the New Zealand Antarctic Society has provided two caretakers for the historic huts — Scott's huts at Cape Evans, and Shackleton's hut at Cape Royds — every season since 1969.

Increased Air Support for U.S. Research Programme

After two seasons with limited air support the United States Antarctic research programme for the 1976-77 season is expected to be the most ambitious for the last three years. This season 287 scientists will work in the Antarctic under the auspices of the National Science Foundation, and a Soviet exchange scientist will winter at the South Pole for the first time.

Last season the scientific programme was reduced by about 35 per cent. With four United States Navy ski-equipped Hercules aircraft available to support the scientific effort again, programmes cancelled, modified or curtailed will be resumed.

Projects this season will include preliminary work on a new station to replace the present Siple Station, 2250km from McMurdo Station, in Ellsworth Land, the recovery of the last of the three Hercules aircraft damaged between January and November last year at Dome C in Wilkes Land, and the resumption of deferred field activities in the Ross Ice Shelf Project.

Last season the third year of field work in the Ross Ice Shelf Project was to be a continuation of surface geological and glaciological investigations, and drilling through the ice shelf to allow investigations of the shelf ice, the water and possible life beneath the shelf, and of the sea bottom sediments. Because of restraints on spending and the temporary loss of two aircraft at Dome C nearly all the field activities had to be deferred. R.I.S.P. will be the biggest single project in the United States programme this season, and will involve scientists from the United States, Britain, Norway, Switzerland, Australia, and New Zealand.

NEW STATION

Siple Station, which was built in 1970, is the most isolated United States station in Antarctica. Last season it was closed for the winter. ("Antarctica", June, 1976, Page 318). Construction of the new station at the foot of the Sentinel Mountains will be spread over the 1977-78 and 1978-79 seasons. It will be ready for occupation by the summer of 1979. Materials for the new buildings will be shipped south this summer.

Recovery of the last of the three Hercules aircraft damaged at Dome C will be a major operation for the United States naval support force this summer. A team of 22 men will be flown from McMurdo Station to the skiway built at Dome C by last season's recovery team. This year's team will work from the camp left behind on the ice-cap between November 20 and January 17.

With its four ski-equipped Hercules aircraft, two of them recovered from Dome C, the Navy's VXE-6 Squadron will begin its regular logistic support for the research programme next month. Aircraft will transport men and materials from Christchurch to McMurdo Station. Flights will then be made to the Amundsen-Scott South Pole Station and Siple Station. For the fifth season support will be provided for radar-echo sounding studies in East Antarctica and other areas.

Air operations from Williams Field on the Ross Ice Shelf near McMurdo Station

will be facilitated by the improvement of acommodation for the men who work there each summer. Living facilities will be upgraded, using ski-mounted modular units. If necessary, the whole field camp can be moved each season.

PENGUIN AIRLIFT

Between 35 and 40 flights between Christchurch and Antarctica will be made this season by United States Air Force Starlifters of the Military Airlift Command. They will transport the bulk of the cargo and most of the scientific and support staff involved in the research programme this summer.

One Starlifter will fly another consignment of live penguins from McMurdo Station to San Diego, California, late in November. Present plans are to take 140 birds back to the United States for research and educational purposes. Smelt will be flown specially from the United States to feed the birds on their journey.

Last November 80 Adelie and 20 Emperor penguins were shipped to California. Twenty were to be made available to Dr H.T. Hammel, of the Physiological Research Laboratory, Scripps Institution of Oceanography, for a long-term research project on the alteration of body temperatures, which he began in 1971. In the 1974-75 season Dr Hammel arranged for 12 Adelie and three Emperor enguins to be flown to California.

Sea World, which collected the Adelies from Cape Bird, Ross Island, and the Emperors from the ice edge of McMurdo Sound, planned to house them last year in a temperature-controlled facility for research, education, and display. The birds reached California safely, and were placed in quarantine. But on the night of December 16 a fire, believed to have been caused by an electrical fault in the refrigeration system, destroyed the quarantine building, and all the birds died from smoke inhalation.

NUCLEAR PLANT

Another project related to the Antarctic environment will be the completion of the dismantling of the nuclear power plant on Observation Hill at McMurdo Station, which began in October, 1973. The plant operated from July, 1962, to September, 1972, and its expected life was 20 years. It was shut down, and a decision made to remove it altogether because of the possibility of chloride stress cracking in the reactor pressure vessel and the primary coolant piping.

Because many of the reactor's components were radioactive from long use, a three-year removal project to dismantle and ship the plant piecemeal back to the United States began in October, 1973. Most of the plant was dismantled and removed during the 1973-74 and 1974-75 seasons. The uranium core was removed from the reactor in July, 1973.

RADIOACTIVE WASTE

Last season the dismantling was continued. Contaminated soil and rock around the plant site were excavated and held for shipment to the United States for disposal. Because of the late arrival of the supply ship Private John R. Towle and the condition of the ice wharf in Winter Quarters Bay, this material could not be shipped last season as planned. But 370 metric tons of radioactive waste were loaded aboard the John R. Towle and returned to the United States.

This season the remaining contaminated soil will be removed, and the nuclear plant complex will be cleaned up. Contaminated material — about 6500 cubic yards — will probably be returned to the United States in the new supply ship Bland when she makes her last trip from the Antarctic.

An extensive site survey will then be made by an independent agency to verify that the dismantling project has been done in accordance with United States Atomic Energy Commission regulations and the provisions of the Antarctic Treaty.

U.S. Operations Start with McMurdo Sound Flights

Spring in Antarctica for 65 Americans, 11 New Zealanders and one Russian exchange scientist on Ross Island, really began early this month when their winter isolation ended with the arrival of two ski-equipped Hercules aircraft from New Zealand. To prepare for the United States scientific research programme for the 1976-77 season, six flights were made by United States Navy VXE-6 Squadron aircraft.

Mail, fresh fruit and vegetables were the cargo most eagerly awaited by the 77 men who have been remote from the outside world since early February. The New Zealanders and their winter neighbours were able to enjoy the scent and colour of spring flowers when the first aircraft arrived; the Americans had the choice of six different flavoured ice-creams with their meals.

Only one of the flights of the operation known to the United States naval support force as Winfly was made in winter — on August 31. The others were completed in the first days of the southern spring, which begins officially on September 1. By the time the last flight was made on September 8, the winter population of McMurdo Station had grown to 200.

In their six flights south, the Hercules aircraft carried nearly 3000 lbs of mail, more than 13 tons of cargo, including fresh food, and 145 passengers. They brought back 781lbs of mail, just over nine tons of cargo and 11 passengers.

Among the 70 passengers in the first two aircraft were scientists who make an early start on summer research projects, and technicians, mechanics, construction workers, and air traffic controllers who will prepare the annual ice runway in McMurdo Sound for the major airlift by Hercules and Starlifter aircraft which begins next month. Captain C.H. Nordhill, the new commander of the United States Navy's support force, flew south to meet the men of his command who have wintered at McMurdo Station, and prepare for the summer season. Also on the first flights were Captain A.N. Fowler, deputy director of the Division of Polar Programmes, National Science Foundation, and Mr R.B. Thomson, superintendent of the Antarctic Division, D.S.I.R.

WEATHER DELAYS

In early spring the weather south of the Antarctic Circle can be uncertain, and this month the Winfly flights were delayed by bad weather. Mechanical problems with aircraft and the weather in the McMurdo Sound area held back the second flights until September 4. Then on September 7 two aircrafts had to return to Christchurch after they had almost reached the point safe return.

On the flight south the aircraft encountered upper air head winds of up to 125 m.p.h. One aircraft turned back near 65 deg. S. and the other near 63 deg. S. Bad weather prevented the aircraft flying south again on the night of their return, and they were delayed another 24 hours. The last flights were completed on September 8, one aircraft making a refuelling stop at Invercargill on the way south.

Several projects in the summer research programme will be resumed this month. These include studies of the pregnancy and birth cycles of Weddell seals on the McMurdo Sound ice at Hutton Cliffs a few miles north of McMurdo Station. Another continuing project is the study of the resistance to infection of isolated groups working during the Antarctic winter — first the men at McMurdo Station, and then in

Two New Zealanders and an American at Scott Base with spring flowers flown from New Zealand on August 31 — the first they have seen for nearly a year. Lieutenant Tim Flynn, medical officer at McMurdo Station, is on the left, and with him are Mike Wing (dog handler) and Ted Ramsbotham (base engineer).

U.S. Navy photo

November the men at the Amunsden Scott South Pole Station.

After six months of isolation, except for telephone calls, mail from home has first place with the winter parties on Ross Island. Next comes fresh food, particularly fruit. This year, however, the Winfly order from the men at McMurdo Station included a request for ice-cream in six different flavours — chocolate, vanilla, banana chip, boysenberry, orange and hokey pokey.

WELCOME FLOWERS

Fresh milk, 1500 dozen eggs and 200 lbs of carrots were in the cargo on the first flights. For salads, the aircraft took 1500 lbs of lettuce, 500 lbs of tomatoes, and 120 lbs of cucumbers. New Zealand kiwi fruit (Chinese gooseberries) are popular in the United States and the Americans in the Antarctic have developed a taste for them. Last season 30 lbs were ordered; this season, 100 lbs.

There were 300 lbs of fresh fruit and vegetables aboard the first aircraft for the New Zealanders at Scott Base, and more vitamin tablets for the huskies. But most welcome of all were spring flowers — violets, jonquils, wallflowers and grape hyacinths — and sprigs of rosemary from a Christchurch garden. They were given a place of honour on the messroom table and were admired by the New Zealanders and their American neighbours.

Mr Ian Joice, one of the men in the Antarctic Division responsible for the resupply of Scott Base, picked the precious flowers. He was at Scott Base last summer and knew how pleasant it was to see, touch and smell flowers where no flowers grow, except indoors.

After the hundreds of letters had been opened and read, the winter residents at McMurdo Station and the new arrivals settled down to prepare buildings, roads and runways for the summer influx.

SIGNS OF SPRING

Winter Parties' Isolation Ends with Early Flights

Darkness, snow storms, cold, and high winds are all part of the winter experience in Antarctica. Ninety-four Americans and New Zealanders who wintered at McMurdo Station, Scott Base, and the Amundsen-Scott South Pole Station this year had the same experience as those who have manned the bases in winter for the last 20 years. For more than six months they were isolated from the outside world, waiting for the return of the sun.

Towards the end of last month the men on Ross Island — 11 New Zealanders, 65 Americans and one Russian exchange scientist, welcomed the first appearance of the sun. Sunlight was followed by the first sign of spring and the end of isolation — the arrival of United States Navy Hercules aircraft which brought long-awaited mail, fresh food, and some New Zealand spring flowers. But winter did not relax its grip immediately. There was a snow storm at McMurdo Station soon after spring began officially on September 1.

Spring was still on the way at the Pole Station 825 miles to the south, where 16 Americans and two New Zealanders have wintered. In the second week of September, they reported that sunlight was tingeing the horizon in pastel pink and gold, and the sun appeared not long after. But the men at the Pole will have to wait until early November for their spring — mail, fresh food, and new faces. Temperatures at the Pole have to rise before aircraft can return after an absence of nearly nine months.

TESTING TIME

Once again the winter was a testing time for the new Pole Station, now occupied for the second year. The civilian scientists and support staff who manned it had to cope with the usual heating, lighting and plumbing problems produced by low temperatures. Drifting snow and accumulated ice meant sessions of hard digging to keep buildings clear.

By early June the men at the Pole were watching the calendar for Mid-winter's Day, the half-way point, and the end of the winter doldrums. In honour of the two New Zealanders, the birthday of Queen Elizabeth was celebrated officially for the first time. The cook produced a special New Zealand meal, and probably with New Zealand advice, baked a pavlova for dessert. There was a trace of snow, and the lowest temperature was minus 69.8 degrees Celsius. Easterly winds and a slight rise in temperature to minus 64.9 degrees marked the middle of the month.

July began with north-east winds which produced "warmer" weather and temperatures as high as minus 46.8 degrees and 47.9 degrees. Weight-lifting, paddle ball and pool occupied the recreation hours, and the station doctor completed the South Pole Medical School's lectures and examinations.

ICE REMOVAL

A fireworks display, and a Las Vegas evening of craps, black jack, roulette, baccarat and bingo, marked the 200th anniversary of American independence on July 4. There was a trace of snow with the north-east winds, and the maximum temperature was minus 50.6 degrees.

In the middle of July ice removal was a major task. Four men spent six days digging out ice ranging from one inch to 3 feet in thickness. The main topic of conversation was how many days of darkness remained. Temperatures showed a slight improvement at both ends of the scale.

July 25 was an important day for the two New Zealanders in the winter team. Messrs B.V. Maguire and B.J. Potter spent the early hours of Sunday listening to a radio commentary on the first rugby test match between New Zealand and South Africa. With the assistance of bottles of champagne and roast beef sandwiches they managed to follow the game except for the last five minutes when signals became too weak to copy.

AURORA DISPLAY

During the last few days of the month the auroras turned on an impressive display, and most of the station staff were outside at all hours to take pictures. This was their last chance to get good aurora pictures because the moon rose on July 30, remained up for two weeks, and then departed for another two weeks. Its departure was followed by a patch of pale light on the horizon, signalling the return of the sun.

In the first week of August the maximum temperature was minus 45.7 degrees. But then on August 8, fuel lines from the fuel arch to the power house were frozen when temperatures dropped sharply, and it took six hours to thaw them out. Inside the station buildings the staff were kept busy on household projects in the kitchen and the library to leave their winter home tidy for the incoming summer tenants in November.

Consistently low temperatures were recorded in the second and third weeks of August. They dropped below minus 70 degrees (-94 degrees Fahrenheit) and reached a minimum of minus 76 degrees (minus 105 degrees F). This temperature was a record low temperature for the year.

These low temperatures enabled all the station staff to qualify for membership of the South Pole's unique Club 300. To qualify, each man had to sit in the station sauna at a temperature of plus 200 Fahrenheit for about 15 minutes, and then dash out bare to be photographed in minus 100 degrees F or lower temperatures.

MORE TWILIGHT

As the sun moved steadily southward the amount of twilight increased, and the men were able to start digging out rubbish covered by drifting snow for the "trash run". But in the last week of August, after six hours of digging, the run had to be delayed because of the return of extremely low temperatures.

By the end of the month all the station staff were waiting for the appearance of the sun they had not seen for almost six months. The main interest was watching the changing glow on the horizon. Watchers reported a small reddish tint with a large area of blue sky over it. The remainder of the sky was still black.

A promise of spring weather was given early this month by a maximum temperature of minus 38.3 degrees, although the minimum was still minus 61.7 degrees. High winds prevented major outside work so the men turned to shovelling snow which had drifted into the station during the winter. The last of the 60 new films provided for the winter, "The Brothers O'Toole" was screened on September 8, and then the re-runs started.

With the return of the sun everyone was much more cheerful. Outside work was possible again, and towards the end of the month, preparations began to make the ice runway ready for the first aircraft in November. Everyone was looking forward to the sight of green grass, flowers, and the warmth of real New Zealand sunshine.

STORMY MONTH

Storms, snow and low temperatures marked the winter months for the men at McMurdo Station. Temperatures were not as low as those at the South Pole, but still low enough to produce minor heating and plumbing problems.

June was a stormy month. Winds up to 52 knots were recorded in the first fortnight, and caused heavy drifting of snow on the new ice wharf under construction in Winter Quarters Bay. Strong winds caused minor power, heating, and water supply failures in the third week, and brought down power lines at the end of the month. Temperatures ranged from a maximum of minus 6 degrees Fahrenheit to a minimum of minus 39 degree.

Light winds, clear skies, higher temperatures, and two light falls of snow were a deceptive introduction to the stormiest month of the winter. Early in July increasing twilight made it easier for staff to travel to Williams Field over the annual sea ice. Snow had drifted over the runway to a depth of 8 to 12 inches.

WIND DAMAGE

Between July 18 and July 24 the station had two fierce storms which damaged buildings, interrupted power supplies, and destroyed weather recording equipment. The peak gust ir the first storm reached 65 knots, and may have been as high as 70 knots. Twenty inches of snow fell during the period, and the high winds piled up huge drifts — in some cases to the tops of the doors into some buildings.

High winds on July 19 damaged a wind speed recorder on one building. After four hours of 58-knot winds with gusts up to 65 knots, the unit began to disintegrate. It was replaced with a spare unit on July 20, but this was lost in the second storm when strong southerly winds blew for 23 hours between July 23 and July 24.

During these storms, a large antenna was damaged beyond further use, a small building was destroyed, and the high winds on July 19 and July 20 caused heat loss in some buildings. Several feet of snow covered most of the ice wharf in depths of 2 to 8 feet.

After the two storms, the men at McMurdo Station were able to make headway with the task of snow removal. In the first weeks of August the maximum temperature rose to zero on August 8, and a peak gust of 49 knots was almost a relief after the storms of the previous month.

BRIGHTER DAYS

With the days growing brighter, short journeys beyond the station became possible. Turtle Rock was reached several times by wheeled vehicle, and the first seven miles of the route north of Hut Point were flagged for safety.

There was evidence of the July storms at Williams Field. Buildings were drifted over, and there were snow drifts on the runways and skiways. Hand digging was needed to enter the tower complex to prepare it before the Winfly flights.

By the third week in August the weather was comparatively mild. The sun rose for the first time on August 20, and the days were marked by light winds and clear skies. The return of the twilight-daylight enabled the working day to be lengthened.

As a prelude to spring there was a fall of 1.6 inches of snow in the last week, and a period of cloudy skies, moderate winds (42 to 53 knots) with blowing snow. The temperature rose to minus 1 degree on August 28. On August 31 the temperature dropped to minus 30 degrees, but the men at McMurdo Station did not mind. Their winter was over.

Cold, darkness, snow drifts and storms did not check the major construction project at the station this winter — building a wider and longer ice wharf. Week after week, despite the bad weather, the work continued. When the winter ended, the man-made ice cube was more than 22 feet thick. It will be ready for use when the first icebreakers arrive.

COLDEST JUNE

Life at Scott Base this winter was much the same for the 11 New Zealanders there. Like their American neighbours, they experienced low temperatures and stormy weather. In his monthly newsletters, the leader, Hamish Raynham, reported that the base had the

WINTER AND SPRING ON ROSS ISLAND, McMURDO SOUND. A
BAY BUILT DURING THE DARK WINTER MONTHS. THE PHO
ANTARCTICA. BELOW IS THE MAIN AREA OF McMURDO STAT
1, AFTER THE LAST DUSTING OF WINTER SNOW.

BOVE IS A VIEW OF THE ICE WHARF IN WINTERS QUARTERS
TOGRAPH WAS TAKEN AS DAYLIGHT WAS RETURNING TO
ON ON THE FIRST DAY OF SPRING, OFFICIALLY SEPTEMBER

U.S. NAVY PHOTO

coldest June since records began in 1957, and July was the windiest month of the winter.

Before the base huskies settled down in their new kennels for the worst part of the winter, they were taken on a trip to White Island, 17 miles away, at the beginning of May. The party — Mike Wing, Grant Eames, John Thomson, and Roger Jones — encountered temperatures around minus 40 degrees. They were confined to their sleeping bags in their tent by a blizzard for one day. After the trip, the huskies were moved to the winter lines and the new kennels.

Temperatures were very low in the last two weeks of the month, and on many days the mercury dropped below minus 40 degrees. The lowest reading was minus 49 degrees, and the highest was minus 14.9 degrees. (This was the lowest maximum reading since recording began in 1957).

June was a cold month at the base — the coldest since records began in 1957. The mean temperature of minus 33.8 degrees broke the previous record mean low (set in 1963) by nearly three degrees. The average mean temperature for June since 1957 has been a warm minus 25.8 degrees.

A new extreme minimum temperature for June of minus 52.2 degrees was recorded on June 2. The previous record of minus 49.2 degrees was exceeded on four separate days during a week when temperatures averaged minus 42 degrees.

Continuous wind for more than a week with a maximum gust of 86 knots made July the windiest month of the winter. But the windy weather did not stop Chris Mills from struggling against 30-knot winds up the hill to McMurdo Station to keep an appointment with the barber. He had been known as Mr Mop by his colleagues until the American barber removed his 18-months growth.

WINTER JOURNEY

Temperatures down to minus 45 degrees did not stop four men — Mike Wing, Clint Davis, Chris Mills and John Thomson — from making an old-fashioned man-hauling journey to circumnavigate Hut Point Peninsula. Such a traverse had not been attempted before with laden sledges in early July.

Led by Mike Wing, the party left Scott Base in clear weather under the light of a full moon. In spite of the cold weather and crevasse hazards, the round trip of 20 miles was completed in 23 hours instead of the estimated three days.

Another man-hauling journey — the last of the winter — was made before the sun rose officially on August 20. Four men — Grant James (leader), Roger Jones, Ian McLeod, and Barry Scannell hauled their sledges 12 miles across the sea ice from Scott Base to the site of a wrecked Super Constellation which crashed when landing in a whiteout several years ago.

In temperatures well below minus 50 degrees, the party took three hours and a half to reach the site. The men spent a cold and sleepless night in their tents, and returned the next day, exhausted, and with frozen beards, noses and hands. But they did see some beautiful mother of pearl cloud effects on the journey.

SUNRISE PREVIEW

With more hours of light each day, there were many meal-time discussions about the actual time and date the sun would be visible. Crater Hill immediately to the north stops the sun from being visible from the base when it is just above the horizon. Official sunrise day was Friday, August 20, and Hamish Raynham raised the base flag again.

But three members of the team, two of whom had wintered before, gained a preview of the sunrise the day before. Clint Davis, Allan Dawrant, and Mike Wing travelled 18 miles west by tracked vehicle, and were the first to see the sun shining down McMurdo Sound.

Another event in August was the arrival of three more husky pups. Three pups born early last season have grown into strong dogs, and have taken their places on the trace.

For the last month of winter the weather was reasonably kind to the New Zealanders, with a minimum temperature of minus 48 degrees and a maximum wind of 66 knots. After the arrival of their mail, fresh fruit and vegetables, the men put the winter behind them, began to enjoy the daylight, and looked forward to their return to New Zealand in October.

Company of Antarctic Adventurers

Pacific and Antarctic expeditions are planned in future by an organisation known as the Company of Antarctica. It has been established to buy a 70ft topsail schooner, formerly in the Baltic trade, and now at Los Angeles, which will be used by the organisation.

Dr David Lewis, who attracted world attention when he attempted to circumnavigate the Antarctic Continent single-handed in his 32ft steel sloop Ice Bird, says in a letter to the New Zealand Antarctic Society, which he has joined, that membership of the Company of Antarctic includes "assorted Antarctic nuts — with room for more". But those he mentions in his letter, Dr Graeme Budd, Colin Putt, and Peter Arriens, are not exactly "nuts" in the Antarctic sense.

Dr Budd was one of the four men who made the first ascent of Big Ben, the 9000ft volcanic peak on Heard Island as members of the South Indian Ocean Expedition of 1964-65. He was scientific officer of the expedition, which sailed south in the 63ft schooner Patanela.

In 1954 Dr Budd was leader at Heard Island, the first Antarctic base established by ANARE in 1947. The base was closed in 1954, the year Dr Budd was leader.

Two attempts to scale Big Ben were made by members of ANARE expeditions, and a third attempt was made in 1963 by Warwick Deacock, Budd and Jon Stephenson, the Australian geologist with the Commonwealth Trans-Antarctic Expedition, who, with Ken Blaiklock, drove the only dog teams to reach the South Pole since Amundsen in 1911.

Warwick Deacock led the South Indian Ocean Expedition to Heard Island in 1964-65. The engineer of the expedition was Colin Putt, a New Zealander, who climbed Big Ben with Deacock, Budd, and another New Zealander, Philip Temple. Peter Arriens, who has joined the Company of Antarctica, is the ANARE leader at Davis this year.

Dr Davis, who describes himself as a nomadic Kiwi, has long been interested in the Polynesian voyages in the Pacific. He is continuing his research at the East-West Centre of the University of Hawaii.



ANARE REPORTS

Winter Party's Trip From Casey Towards Vostok

A 330-kilometre glaciological traverse inland from Casey towards the Soviet station, Vostok, was made by six members of the Australian National Antarctic Research Expeditions' winter team at the station in April and May. The party spent six weeks in the field, and experienced temperatures down to minus 40deg Celsius.

Summer operations by ANARE included the first Australian visit to the main Soviet station, Molodezhnaya, 720 kilometres west of Mawson. As part of the field survey operations in Enderby Land an ANARE party visited Proclamation Island where Sir Douglas Mawson, leader of the British, Australian, and New Zealand Antarctic Research Expedition (B.A.N.Z.A.R.E.) proclaimed British sovereignty over Enderby, Kemp, and MacRobertson Lands on January 13, 1930.

Late in May six tired and weary men returned to Casey after making glaciological measurements on the polar ice-cap, and establishing a depot of about 20,000 litres of fuel for use by another expedition planned for this spring. The party was led by plant inspector Tony O'Mara. Other members were Peter Keage (glaciologist); Trevor Brooks (electronics engineer); Tony Jacques (meteorology observer); Gerry Bryant (radio officer); and Robin Regester (senior diesel mechanic).

During the six weeks in the field, the men, who are members of the winter party of 23 at Casey, experienced visibility down to 50 metres, and the tractor train — three tractors towing living and workshop caravans, and several sleds loaded with fuel, supplies and scientific equipment were navigated by marine radar.

On the return journey, one of the tractors — affectionately named Linda — broke down, and could not be repaired. Because of deteriorating weather, the difficult terrain, and the advance of winter darkness, the tractor had to be left behind in the field. It will be reovered in the spring when the weather improves.

FIRST VISIT

Seven Australians made the first visit to Molodezhnaya by helicopter on January 8. They were warmly welcomed by the Russians who afforded them every facility, generously refuelled their helicopters, and showed marked interest in the Australian activities and field equipment.

They were part of the summer party led by Doug Twigg, which had been flown into Enderby Land by way of Mawson from the Nella Dan at Christmas to undertake ground surveys, aerial photography, and geological studies. The visit to Molodezhnaya was made to enable the Australians to complete a continuous

line of survey observations which, after several seasons of summer operations, now stretches 2000 kilometres from Davis to Molodezhnaya, where it joins the Russian survey grid.

The party comprised Doug Twigg, senior technical officer (radio) of the Antarctic Division; Col Alf Argent, aviation officer; John Manning, surveyor with the Division of National Mapping, Department of National Resources; John Sheraton, geologist with the Bureau of Mineral Resources, Department of National Resources; and helicopter pilots, Vic Barkell, Ross Hutchinson, and John Sonneveld.

SOVIET WINE

One woman and 84 men of the ANARE winter teams celebrated Mid-Winter's Day on June 21 at Mawson, Casey, and Davis in Antarctica, and on Macquarie Island in the sub-Antarctic. Mean temperature at the continental stations were down to minus 16deg Celsius.

Mawson began the celebrations on June 20 with the Mid-Winter Derby, a handicap race over sea ice around a nearby island. The entrants used a variety of transport, including dogs and sledges, skates, motor-cycles, and motorised toboggans.

Mid-Winter dinners of many courses, and with appropriate wines were enjoyed at all stations. On Macquarie Island the winter team toasted families and friends and members of all other Antarctic expeditions in Crimean champagne, a gift from members of the Soviet Antarctic Research Expedition which visited the island earlier this year. A feature of the dinner was a cake baked in the shape of the island by the cook, Frank Reid, and decorated by Dr Zoe Gardner, the first woman to winter with an Australian expedition.

ROCK CAIRN

When ANARE members visited Proclamation Island (in about 65deg 50min S/53deg 41min E) in January this year they found the rock cairn built by Mawson's party, which had not been visited since 1930. Mawson and a party from the B.A.N.Z.A.R.E. vessel Discovery came ashore on January 13, 1930. They built a rock cairn which supported a pole on which the Union Jack was raised to mark the occasion, and the signed proclamation of sovereignty for British over Enderby, Kemp, and MacRobertson Lands was left at the site together with a wooden tablet. (An Imperial Order-in-Council which came into force in 1936 later passed this and other Antarctic territory to Australia).

John Manning, surveyor with the Division of National Mapping, Department of National Resources, and a member of the Enderby Land survey team photographed the historic monument, and the proclamation. He reported that the flagpole had been broken in the wind but was still in good condition, and that pieces of the ties used to secure the flag were still attached.

Carved into the wooden tablet were the words (which had not been recorded previously): The British flag was hoisted and British sovereignty asserted on the 13 Jan. 1930.

HISTORIC RELIC

The proclamation had been rolled and placed in a glass vial, and was still perfectly legible. However, the metal canister into which the vial had been placed was almost completely corroded away. The best method of preserving this valuable historic relic is now being considered.

There are some minor differences in the text of the proclamation found by the ANARE party, and that given in the Mawson papers. The text in "The Winning of Australian Antarctica", by A. Grenfell Price, which is based on the Mawson papers, runs as follows:

In the name of His Majesty King George the Fifth, King of Great Britain, Ireland and the British Dominions beyond the Seas, Emperor of India. Whereas I have it in command from His Majesty King George the Fifth to assert the sovereign rights of His Majesty over

John Manning, a surveyor with the Division of National Mapping, Department of National Resources, at the historic site on Proclamation Island, Enderby Land, where Sir Douglas Mawson, leader of the B.A.N.Z.A.R.E. expedition, proclaimed British sovereignty over Enderby, Kemp, and MacRobertson Lands, on January 13, 1930.

Photograph by J. Manning

British land discoveries met with in Antarctica.

Now, therefore, I Sir Douglas Mawson do hereby proclaim and declare to all men that, from and after the date of these presents, the full sovereignty of the territory of Enderby Land, Kemp Land, Mac. Robertson Land, together with off-lying islands as located in our charts constituting a sector of the Antarctic Regions lying between Longitudes 73deg East of Greenwich and 47deg East if Greenwich and South of Latitude 65deg vests in His Majesty King George the Fifth His Heirs and successors for ever. Given under my hand on board the Exploring vessel "Discovery" now lying off the coast of this annexed land, in Latitude 65deg 50min S, Longitude 53deg 30min E. The Thirteenth Day of January, 1930.

Witness	(Signed)Douglas
(Signed J.K. Davis	Mawson
Master	Commanding Ant-
S.Y. Discovery	arctic Expedition
13.1.1930	13.1.1930

In the proclamation found by the A.N.A.R.E. party the last sentence reads: Given under my hand at this spot. Davis signs himself John King Davis, master of the exploring vessel Discovery, and Mawson describes himself as commanding expedition.

Proclamation Island is a small rocky island about 850ft high, some three miles west of Cape Batterbee, and about one mile off the coast of Enderby Island. In his log Davis stated that the rock was called Possession Island, and subsequently Proclamation Rock.

In his diary of the first of the B.A.N.Z.A.R.E. voyages Mawson describes the landing on Proclamation Island, which he called the black island, and the proclamation ceremony. "Whilst main party hastened to summit of island to fly the flag, Simmers and Howard ran a magnetic survey. We ascended through the (Adelie penguin) rookery. Very steep climb to top but rewarded by magnificent view over grounded bergs ....Height above sea level of top 850ft.

"We erect flagpole, stacking rocks about the foot to make it secure. The tablet on pole faces south. Proclamation read at noon — 3 cheers given for King and God Save King sung."

Two New Zealanders were present on the historic occasion. They were Sir Robert Falla, then the expedition's young ornithologist, and Dr R.G. Simmers, who was the meteorologist. A. Howard, who took part in the magnetic survey of Proclamation Island, was an Australian hydrologist.

WOMEN'S VISIT

ANARE operations last summer were marked by the participation of women. Three staff members of the Antarctic Division, Elizabeth Chipman (publications officer), Jutta Hosel (senior photographer), and Shelagh Robinson (welfare officer) were the first group of Australian women to visit the Antarctic Continent when they made a five-week round trip on the Thala Dan.

Together with Dr N.C. Gardner, of Britain, who travelled with them, they were the first women to visit Casey. Dr Gardner, who stopped off at Macquarie Island on the return voyage to serve a year as the island's doctor, is the first woman to spend a winter with an ANARE expedition.

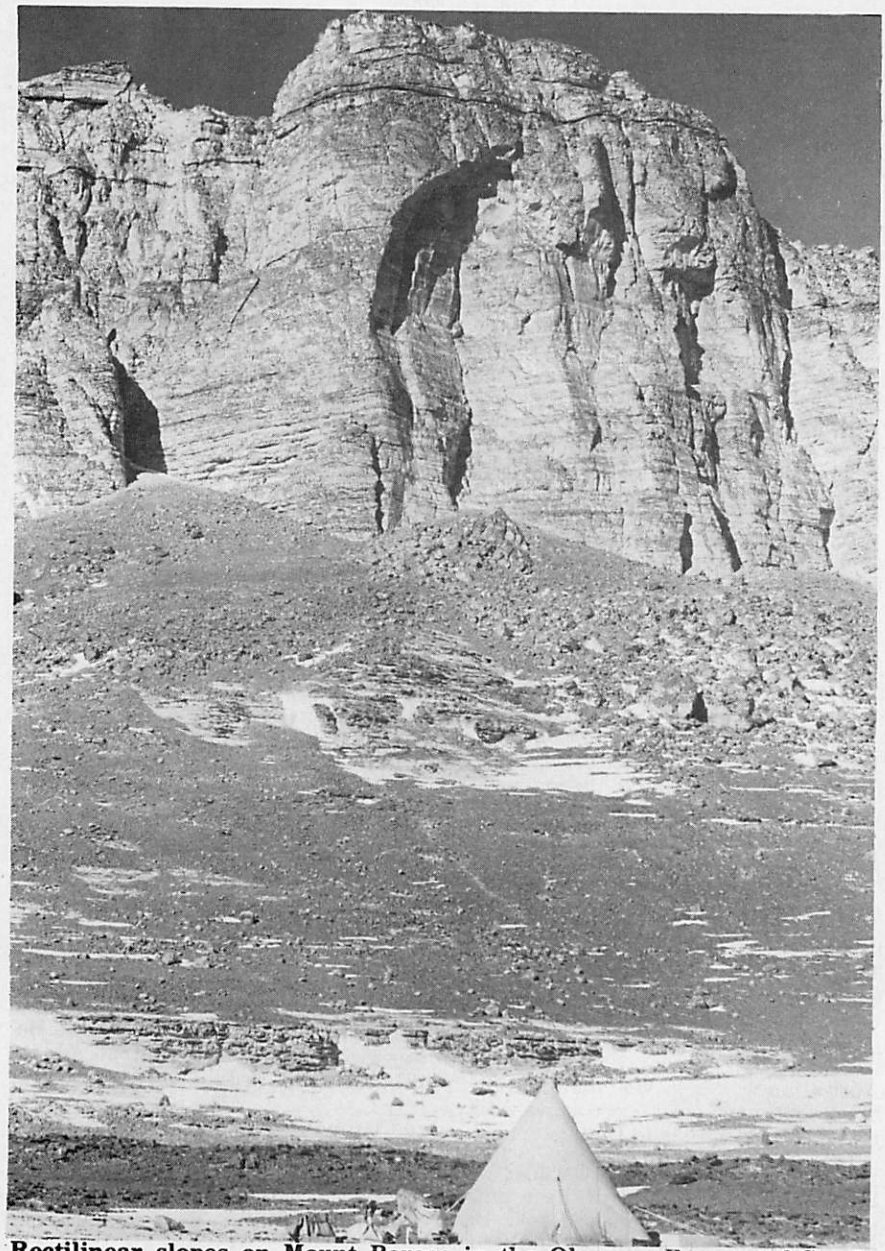
Dr Gardner was one of four doctors recruited at the last moment after difficulties in obtaining doctors willing to serve at the Antarctic stations in 1976 threatened to interfere seriously with the Australian Antarctic research programme. She was travelling in Australia when she applied for the post.

Four other women visited Macquarie Island during a relief voyage to this sub-Antarctic station earlier last summer. They were Anne Dalby, quarantine officer, and Ann Pitt, personnel officer, both of the Antarctic Division; Jenny Hobson, producer's assistant with the Australian Broadcasting Commission's natural history unit; and Elizabeth Kerry, a botanist at Melbourne University.

LONG SERVICE

Few men have contributed as much to the carrying out of Australian research programmes in Antarctica as Mr Don Styles, deputy director of the Antarctic Division, who retired in June after almost 19 years' service. His association with southern latitudes began in 1957 with an expedition to Macquarie Island. Since then he has made 19 annual voyages to the Antarctic.

Don Styles has visited all Australian stations, the French stations at Dumont d'Urville and Kerguelen Island, and the Soviet station, Mirny. Many of his voyages involved coastal exploration of Australian Antarctic territory never before visited. Styles Bluff in Kemp Land, and Styles Strait in Enderby Land are named after him as a result of his leadership of expeditions in the areas. He was awarded the M.B.E. in 1966, and in 1974 the Polar Medal.



Rectilinear slopes on Mount Boreas in the Olympus Ranges of South Victoria Land. Scientists from the University of Waikato will continue their studies of comparative slope development on the Olympus Ranges this season.

B.A.S. NEWS

Antarctic Peninsula Bases Record Low Temperatures

Mild weather at Halley Bay on the Caird Coast of Coats Land, and low temperatures and strong winds on the west coast of the Antarctic Peninsula have marked winter at the British Antarctic Survey bases this year. Scientists have maintained geological, glaciological, and biological programmes during the winter, and preparations are now being made for the summer season.

There was a minor crisis at Halley Bay in July, when an unmanned VHF goniometer hut, established three miles from base for a University of Sheffield project, was destroyed by fire. It was quickly replaced by a caboose (mobile hut) fitted with an old goniometer, and the programme was resumed within a few days.

Short journeys have been made from the base, many of them to inspect possible sites for unloading the R.R.S. Bransfield this summer. Last year's relief was exceptionally difficult and the ship had to be unloaded 50 miles away.

Next season, an attempt will be made to take the ship in earlier before the fast ice breaks out from the cracks near the base and access to the ship by vehicles becomes impossible. If this fails unloading could take place straight on to high ice cliffs using a high-wire system, but three extra vehicles and drivers will be taken south in case unloading again has to be done at a distance.

MELT PROBLEMS

A journey was made in May to the original Halley Bay hut built in 1956 as the Royal Society's contribution to the International Geophysical Year. The hut is now buried under 80ft. of snow and very badly distorted.

Weather in the area this winter has been comparatively mild, and the remaining dogs have been able to spend most of the time out of doors. In contrast, the west coast of the Antarctic Peninsula experienced unusually low temperatures in June, accompanied by whiteout winds to 80 knots. This was followed by milder northerly gales which caused melt problems.

At the Argentine Islands base the low temperatures consolidated the sea ice which later survived the northerly gales, and trips to the mainland have been possible throughout the winter. An island 8 miles west of the base was also visited.

Parties from the Adelaide Island base made frequent visits to the new hut at Rothera Point, 40 miles to the north-east where four men are wintering. The main journey took place in mid-July when five men with an International tractor, a caboose, two dog teams and six sledges transported a cement mixer and other equipment and stores to Rothera Point ready for the coming summer.

TRACTOR ACCIDENT

They were met on the way by the four Rothera men, who travelled in two sno-cats and skidoos. The dog teams covered the distance very quickly, but the tractor party were delayed when the 6-ton International tractor broke through into a crevasse, fortunately without injury to the men or loss of stores. Three days were spent retrieving it.

On South Georgia, a small hut has been transported to a col above the base for the winter glaciological programme. In June, hunting parties were out replenishing the base supply of reindeer

meat, and a number of short journeys were also made to coastal work sites. Climbing parties made the most of unusually fine weather in July to visit peaks inland.

At Signy Island, all the long-term winter programmes have been resumed, including diving through sea ice by the marine biologists.

PENGUIN AND SEAL

Since 1956 many men who have served with the Falkland Island Dependencies Survey and the B.A.S. have enjoyed meals served or cooked by Gerald T. Cutland. Gerry, as he is widely known, retired recently after 18 years as chief steward of the Royal Research Ship Biscoe.

Gerry first went south in 1955 as cook at the Argentine Islands where he stayed for 1956 and 1957. There is expertise with what were rather unpromising ingredients, supplemented by such local wildlife as seals, penguins, and shags, earned him the admiration and gratitude of his companions. They enjoyed such dishes as tournedos of seal Portugaise, braised penguin breast, and savoury shag hot pot.

In later years Gerry's benign influence spread throughout the Survey when his recipes were circulated to all bases, and later generations learned what could be done with reconstituted eggs and vegetables, herbs, Bovril and Bisto, to make palatable meals from seal meat and penguin breasts.

CULINARY SKILL

"Recipes for an Antarctic Cook" by Gerald T. Cutland, were published in the "Polar Record" in September, 1959, and made the author even better known. An editorial note said that the recipes based on "local raw materials" were published because his skill and initiative deserved acclaim amongst a wider circle.

Some of those recipes were for dishes made with the meat of young shags, but that was before the Antarctic Treaty prohibited the taking of birds for the pot. Now Antarctic cooks cannot follow Gerry's instructions; use of his local raw materials is not possible.

Gerry Cutland's cheerful presence will be greatly missed aboard the R.R.S. Biscoe. He will be remembered by the men who ate his meals in 1956-57, and the cooks who followed his recipes, as the man whose Antarctic menus included jugged shag, savoury shag hot pot, and even a Spanish paella with shag (plus tomatoes, sausages, rice, tinned crayfish, tinned meat, tinned peas, and reconstituted French beans and onions.

NEW HEADQUARTERS

B.A.S. has settled happily into its new headquarters on the outskirts of Cambridge and the building is now full. The number of occupants has reached its summer maximum of more than 150, now that scientists returning from the Antarctic have started work on their results and new recruits have arrived for training. In addition, several rooms are now occupied by the Seals Research Division of the Institute of Environmental Research, formerly based at Lowestoft, as its work is relevant to that being done by the Survey.

Most of the facilities are now functional. The cold room was moved successfully to a site in the courtyard of the new building without the loss of any of the live specimens (the fish Notothenia neglecta and N. rossii, an isopod, large nemertines and limpets), some of which were collected in the Antarctic three years ago. Problems encountered in maintaining a steady low temperature while Cambridge has sweltered in an unusually hot summer, have been solved by covering the hut with reflective foil.

MEDICAL WORK

For about 18 years B.A.S. medicine and medical research were supervised by Dr O.G. Edholm, head of the Division of Human Physiology of the Medical Research Council, but when he retired in 1974 the division was disbanded and its Antarctic work discontinued. The latter has now been transferred to a new Institute of Environmental Medicine which has been set up as part of the University of Aberdeen's Department of Surgery.

The proximity of mountains, the existence of a local fishing industry and the development of North Sea oil make Aberdeen a particularly suitable centre for environmental studies. There is great scope there for complex and sophisticated medical work in this field, and the Antarctic could be regarded as a laboratory for long-term related studies, (for example, on the problems encountered in diving in cold water) which could be mutually beneficial.

Two members of the staff at Aberdeen already have Antarctic experience. They are Mr Nelson Norman, reader in surgery, who was medical officer at Halley Bay in 1959, and Colonel James Adam, newly appointed senior lecturer in environmental medicine, formerly of the Royal Army Medical Corps. Colonel Adam spent some time working at the South Pole in the 1957-58 summer with a physiologist Dr. Griffith Pugh, of the Medical Research Council's High-altitude Committee who accompanied the successful Everest expedition of 1953.

This arrangement is important for B.A.S. as it will solve the basic problem of recruitment. In future, interested medical students will be recruited at Aberdeen, given additional specialised training and guidance in the preparation of research projects, and then go south when qualified. On their return they could be attached to the institute of teaching hospital. Other medical officers might be recruited from elsewhere and these would have their own projects and supervisors.

The present medical examiner for new B.A.S recruits, who is on the staff of Addenbrooke's (teaching) Hospital, Cambridge, is particularly interested in promoting research projects in biochemistry. Contact will also be maintained with various departments of the Medical Research Council.

B.A.S. owes much to Dr. Edholm for his guidance for so many years, and for continuing to foster international co-operation as the United Kingdom representative on the S.C.A.R. working group on human biology and medicine. "Polar Human Biology" (the proceedings of the S.C.A.R.—I.U.B.S. symposium held at Cambridge in 1972) which he edited, was a valuable summary of the work done to date.

New Icebreaker Will Not Go South

Ice breaker support for the American scientific and logistic programmes will be provided as usual by the United States Coast Guard. But its newest and most powerful icebreaker, the 13,000-ton Polar Star, will not be seen in Antarctic waters this summer. The Polar Star, which was commissioned in January, had had serious problems with her propellers during shakedown trials in the Pacific off Alaska, and will not be ready in time.

One of the veteran Antarctic icebreakers, the Burton Island, which is due to be decommissioned after 30 years polar service, will probably sail south again in place of the Polar Star. The main icebreaker support will be provided by the Glacier, which has operated in southern waters since 1955. She, with the Burton Island, will clear the annual sea ice in McMurdo Sound, and escort the cargo ships up the channel. Later she will support scientific projects at sea.

Another Antarctic veteran, the Private John R. Towle, which carried cargo to the Antarctic for nearly 20 years, has been replaced by a larger ship, the U.S.S. Bland, which will have her hull strengthened for ice operations. Supply of fuel for United States stations and air operations will again be the mission of the 25,000 ton tanker Maumee. She will discharge 4.6 million gallons of fuel at McMurdo Station early next year.

British Climbers and Crew of Argentine Plane Killed

Fourteen men died in the Antarctic this month, 11 of them when an Argentine Navy aircraft hit a peak on Livingston Island in the South Shetlands. Three men from the British Antarctic Survey's Argentine Island's base died in an attempt to climb Mount Peary on the west coast of the Antarctic Peninsula.

Wreckage of the Argentine Neptune aircraft was reported by a searching Argentine Navy Hercules to be near the summit of the peak on Livingston Island. The Neptune was reported missing on September 16. It was on its way back to its base in the Argentine after a survey of navigation conditions over the Antarctic Peninsula. Regular radio reports every 15 minutes from the aircraft stopped suddenly for no apparent reason when it was passing over the northern tip of the peninsula. There was no May Day signal.

On September 18 a search began with seven different aircraft from the Argentine. Chilean and Argentinian Antarctic bases reported having heard an emergency signal on an emergency frequency. But the message was garbled, and no bearing could be obtained.

When the Hercules sighted the Neptune it reported that the aircraft appeared to have hit the side of the mountain. From the position of the wreckage the Neptune appeared to have been flying south, not north, at the time.

An Argentine Twin Otter aircraft attempted to fly in to determine the exact location of the crashed aircraft on September 19. Bad weather and poor communications prevented this, and also delayed the plan for the Argentine Navy's icebreaker General San Martin to send in a helicopter to recover the bodies of the Neptune's crew.

A ground party from the Chilean base, Capitan Arturo Prat, on Greenwich Island, about five miles north of Livingston Island, crossed the north-east corner of the island from where it could observe the site of the crash. It reported that the wreckage of the Neptune was at a point 80 metres above sea level, and lodged on a 60-degree slope.

High winds, heavy snowfalls, and low temperatures hampered the search for the three men from the Argentine Islands base. They set out on September 3 to climb Mount Peary, 15 miles away, on the mainland. Mount Peary, which is 1900 metres high, forms part of a range of mountains in what is known as the Tierra de San Martin.

Three days later the three men, Graham Whitfield, a physicist aged 24, Geoffrey Hargreaves, a 21-year-old meteorologist, and Michael Walker, a 21-year-old cook, who were all experienced mountaineers, radioed back that they had climbed the peak, but nothing more was heard from them.

A full-scale search by British, American, and Argentinian parties began on September 6. An Argentine Twin Otter aircraft searched the area of Mount Peary and spotted an emergency tent, two pairs of skis, and a red marker flag on a ridge just west (300 metres) of the edge of the mountain plateau.

Snowstorms and piercing winds hampered the ground and air search. The Twin Otter flew to the United States Palmer Station on Anvers Island from where the search and rescue operations were directed. Arrangements were made for the Argentine aircraft to fly to Adelaide Island, and pick up three experienced British climbers from Rothera Point. It was to fly to the Peary Plateau, land there, and leave the search party.

After a search for more than a week, the three climbers were assumed to have died. Dr Richard Laws, director of the British Antarctic Survey, issued a statement in which he said that although the field party had been properly equipped for the expected duration of its journey, it had suffered continuous rigorous conditions beyond those of human endurance. The survey had been forced to the unhappy conclusion that the field party had perished.

Originally both air and ground searches were to have been continued in an attempt to establish the facts relating to the incident. But the search for the bodies of the three men was called off towards the end of the month. It will be resumed later in the season, probably in November.

Soviet Plans for More Research in Weddell Sea Area

An increase in the scale of scientific research in the Weddell Sea area is planned by the 22nd Soviet Antarctic Expedition in the 1976-77 season. Last season a new scientific station — Druzhnaya — was established on the Filchner Ice Shelf for summer work, and a party of Soviet scientists began the first of a series of studies, which will last for several years, of the mountain systems which fringe the Weddell Sea between Ellsworth land and Queen Maud Land.

Last season's party of geologists, geophysicists, and topographers, which was led by a 42-year-old geologist, Garik Grikurov, surveyed some 20,000 square miles in the area, and set up ground control stations in the Pensacola and Theron Mountains, and the Shackleton Range. The configuration of the bed of the Weddell Sea was ascertained, and studies were made of the earth's magnetic and gravitional fields.

Geologists collected rock and mineral samples from the Shackleton Range and the Pensacola Mountains. A surprising find was an accumulation of fossil trilobites, primitive crustaceans which lived about 5000 million years ago.

Druzhnaya is to the west of General Belgrano, the Argentine station on the Filchner Ice Shelf. During their stay the Soviet scientists made contact with the Argentine party, and also with the British Antarctic Survey base at Halley Bay. When Druzhnaya was established late last year one of the Soviet expedition's ships called at Halley.

This season American and Soviet scientists will work together in Antarctic waters to examine the effect of the polar ice-cap on the world's climate. Agreement on these joint studies was reached at a conference in Leningrad in July.

The Soviet research ship Professor Zubov will begin observations this year in the Indian Ocean sector, and the United States research ship Thomas G. Thompson will explore Drake Passage between South America and the Antarctic Peninsula. Each ship will carry a scientific team from the other country.

Italian Expedition Worked on King George Island

Geological studies of the shoreline and seabed of Admiralty Bay on King George Island in the South Shetlands were made by a private Italian expedition of scientists and mountaineers which spent several weeks in the Antarctica Peninsula area during January and February this year. The expedition also did underwater exploration, and climbed seven peaks, four on Wiencke Island, south-west of Anvers Island, and three on Livingston Island in the South Shetlands.

A group of Italian sponsors financed the expedition of 15 men, which was led by Professor Renato Cepparo, a film producer, mountaineer, and skier. The expedition established a small camp of prefabricated buildings at a spot in Admiralty Bay which was called Conca Italia. With accommodation for eight men the camp covered an area of 80 square metres. Stores, diesel oil, and petrol were left behind, and fresh water can be piped from a nearby stream.

Originally the expedition intended to use a 500-ton vessel called the Repunte, formerly used for fisheries research by the Food and Agriculture Organisation. Instead it chartered a Norwegian vessel called Rig Mate with a crew of nine. The Rig Mate sailed from Lisbon on December 22 last year and reached Montevideo on January 9. Stores, equipment, and building materials were picked up there, and then the Rig Mate sailed for King George Island.

PLANS CHANGED

In a report on the work of the expedition Professor Cepparo says that the original plan was to establish a base on James Ross Island, which is in the Weddell Sea, and on the south-east side of the Antarctic Peninsula. Because of delays, and the possibility that by the end of the summer the Weddell Sea might freeze up and isolate the research team which was to be left on the island, the expedition changed its plans and made for King George Island.

During the expedition's stay in Admiralty Bay seven research workers operated from the camp: biologists, geologists, and paleoclimatologists. Another group took the Rig Mate and sailed to Wiencke Island for mountain climbing and underwater exploration. Scientific date and specimens brought back to Italy are now being assembled and examined at the Universities of Milan and Genoa.

Professor Cepparo says that biological research involved the analysis of eight blood samples taken from each member of the expedition. Certain variations were noted which could not be related to such factors as food or physical activity, but were probably due to environmental conditions. Because of the expedition's information was being sought from other countries with bases in the Antarctic.

SEABED SURVEY

Observations were taken along the coast of Conca Italia as far as Point Thomas where a more or less continuous stretch of ancient shoreline was noted. In this area samples were taken for sedimentological analysis. With the aid of core lifters a whole series of samples was obtained from the sea bottom in Admiralty Bay, the drills being lowered from the deck of the Rig Mate.

Almost the entire seabed of the bay was surveyed and sounded right up to its entrance. This was done to obtain a picture of the nature and composition of the marine sludge. Records and samples of morainic accumulations were also taken along the island shores to either side of the base camp. At the mouth of the bay extensive layers of fossilised tree trunks were found beneath a moraine deposit two kilometres long and 200 metres wide. At first sight the tree trunks did not seem to be completely fossilised. Samples are now being tested for age by the Carbon 14 method.

WEATHER RECORDS

Climatological observations were made at the base camp, and ground temperatures, wind readings, humidity, and atmospheric evaporation, were recorded every three hours. Because of the location of the camp this data was correlated with physical characteristics relating to the presence of the freshwater stream and sea nearby. For this purpose hourly temperature readings and other daily recordings were taken for chemical and physical calculations. Atmospheric condensation was collected and recorded, and rainfall readings were made for subsequent analysis for possible traces of acid pollution.

Professor Cepparo says that the expedition's programme for correlating sedimentological and paleoclimatological data was based on abundant samples, and plenty of specimens of submarine flora and fauna were collected at higher latitudes. It was hoped that when this extensive body of data and sample material had been examined and interpreted by research scientists, it would provide a full picture of the geological, geomorphological, hydrological, and oceanographic characteristics of Admiralty Bay.

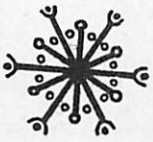
Underwater operations were conducted by two expert skin divers working in the cold Antarctic waters. Deep-sea diving was carried out in various latitudes on 10 seperate occasions, and at depths of five to 33 metres. Rock samples were collected as well as many specimens of flora and fauna. The water temperature ranged from 1deg to minus 1.8deg Celsius, and the average time of each dive was 40 minutes. The deepest dive was made in the latitude of the Antarctic Circle.

PEAKS CLIMBED

Seven peaks, hitherto unscaled, were climbed by the group which went to Wiencke and Livingston Islands. To climb the peaks "Ragni di Lecco" and "Cima Italia" in the Wall Range on Wiencke Island the Himalayan technique was used. In the case of "Ragni di Lecco" 600 metres or rock face were equipped with fixed climbing ropes.

"Cima Italia" was scaled successfully in extremely severe weather, and against strong gusts of wind which swept its slopes. Before the attempt was made a small camp of two tents was set up beneath the precipitous rock wall.

During its visit to the Antarctic Peninsula area the expedition met the research team and crew of the British Antarctic Survey's R.R.S. John Biscoe, and the mountaineering group in Wiencke Bay went aboard the United States National Science Foundation research vessel Hero at the end of January during one of her cruises from Palmer Station. The Rig Mate called at Palmer Station, and then sailed for Rio di Janeiro which was reached on February 25.



Antarctic Centre has many relics of Heroic Age

Relics of the first expedition to winter on the Antarctic Continent at Cape Adare in 1899, and of the "worst journey in the world" to Cape Crozier in the winter of 1911, have been added in recent months to the Canterbury Museum's Antarctic collection. The museum already has the basis of the most comprehensive collection of Antarctic literature in the Southern Hemisphere; when the new Antarctic centre is opened early next year it will contain an equally comprehensive collection of relics of the Heroic Age of Antartic exploration, and equipment used by British, American, and New Zealand expeditions in the last 20 years.

Many of the historic relics have come from relatives of men who served with Borchgrevink, Scott, Amundsen, and Shackleton. Others have been given or deposited on permanent loan by other institutions overseas or in New Zealand. Among these are the Scott Polar Research Institute, New Zealand's National Museum in Wellington, and the Department of Scientific and Industrial Research through its Antarctic Division.

Cape Adare is remembered in Antarctic history as the place where two parties wintered — Borchgrevink's Southern Cross Expedition, 1899-1900, and Scott's Northern Party led by Commander Victor Campbell in 1911. Both parties experienced violent gales there, and relics recovered by the Antarctic Division included weather recording equipment.

One is an anemometer or wind guage used by Commander Campbell. It was made in 1909 by the London firm of R.W. Munro, and is still in working order after exposure to the elements from 1911 to 1973 when it was recovered.

Lieutenant William Colbeck and Louis Bernacchi shared the meteorological recording duties in Borchgrevink's expedition. On October 5, 1899, they recorded 6¾ hours of sunshine at Cape Adare. The record appears on a chart from a Campbell-Stokes glass sphere sunshine recorder presented by the D.S.I.R.

Other material from Cape Adare includes an iron harpoon head with a hinged barb, a paint brush of Adelie penguin feathers, bound to a wooden handle, and two fishing lures, possibly used by Nikolai Hanson, the zoologist and taxidermist with Borchgrevink, who died on October 14,1899, and was the first man to be buried on the continent.

Borchgrevink's party did a lot of fishing, not only for scientific purposes but also to supplement their diet of canned food. In "First on the Antarctic Continent" Borchgrevink describes how the expedition had so many specimens of fish preseved by early May that he decided to use some as additions to the stock of provisions.

Most of the fishing was done by Hanson and Anton Fougner, the expedition's handy man. They fished from the ice floes in Robertson Bay or through holes cut in the ice. Most of the fish were caught on a strong line with an ordinary Norwegian "pilk" (lure) attached, and without any bait.

SHIP MODEL

Another relic of Borchgrevink's expedition is a model of his ship, the Southern Cross. It was built from memory by a Stewart Island resident, probably soon after the vessel arrived at Oban, Half-Moon Bay, at the end of march, 1900. During his stay there Borchgrevink arranged to land his sledge dogs on nearby Native Island. Some of these dogs returned to the Antarctic with Shackleton's expedition in 1908-1909.

In the autumn of 1957 a tractor and sledging party led by Sir Edmund Hillary repeated the historic journey to Cape Crozier of Wilson, Bowers, and Cherry-Garrard to study the breeding habits of the Emporor penguin. The New Zealanders, however, travelled from Scott Base instead of Cape Evans. From the remains of the stone igloo built by Scott's men 800ft above the cliffs at Cape Crozier Hillary's party uncovered equipment abandoned 46 years earlier before the return trip.

A 9ft man-hauling sledge, and other relics were brought back to New Zealand with the approval of Cherry-Garrard, the only survivor of the journey. The sledge has now been transferred on long-term loan from the National Museum. The Canterbury Museum already has a thermos flask and scientific instruments from the igloo; the Gisborn Museum has presented a hurricane lamp on indefinite loan.

LYTTELTON LINK

Because Lyttelton was the port of departure for the Discovery and the Terra Nova, some of the historic relics have come from people who knew members of Scott's two expeditions or had family links with them. Among are small items which were gifts in return for hospitality received in Christchurch and Lyttelton.

Hartley Travers Ferrar, the geologist with the Discovery expedition, later joined the New Zealand Geological Survey. His sister, Mrs M. Forbes, of Cambridge, England, has presented to the museum some of his sledging equipment — goggles, pannikin, and cutlery. A microfilm of his 1902 desk dairy has come from Mr H.G.R. King, librarian of the Scott Polar Research Institute.

One of the New Zealanders who served in the relief ship Morning during the Discovery expedition was Arthur Beaumont, of Lyttelton. He sailed on the second voyage south in 1903. His relatives have presented to the museum a woollen balaclava he wore on the trip south, his Polar Medal in bronze, his discharge certificate, and other items.

SMALL GIFTS

Sir Clements Markham, whose name is linked with the first great land explorations of Antarctica, led an expedition to Peru before he began his long service to the Royal Geographical Society. A member of the expedition was Charles Christopher Bowen, of Christchurch, who was prominent in political life, and an enthusiastic supporter of Scott's expeditions. His sister, Miss C. Bowen, has given to the museum items associated with the Discovery expedition, and Sir Clements Markham.

A pipe with "Discovery" and a penguin engraved on the front of the bowl, and a paper knife with "Discovery" engraved on the blade were given to Sir Charles Bowen by Markham. Other gifts are a small two-drawer wooden cabinet with sheet brass inlay, which once belonged to Markham and an autographed proof engraving of his portrait as president of the Royal Geographical Society from 1893 to 1905.

CAPE EVANS

Material associated with Scott's last expedition from the National Museum's collection was mostly recovered from the hut at Cape Evans in 1957. It includes an oak kitchen type dining chair, a single-burner Swedish primus stove used by field parties, and a caribou skin sleeping bag, patched in places, which was standard equipment for both field and shore-based parties. Two maximum

thermometers in a mahogany case lined with blue velvet and satin were probably used by George Simpson, the expedition's meteorologist.

A sample of the aluminium telephone wire laid by the dog driver, Cecil M. Mears, between Cape Evans and Hut Point during the Terra Nova expedition has come from the D.S.I.R. collection, and also a British Post Office portable test meter used for the telephone link. "It seems wonderful in this primitive land to be talking to one's fellow beings 15 miles away," wrote Scott in his diary after the Hut Point telephone bell suddenly rang at 5 p.m. on October 6, 1911, and he had talked with Meares and Oates.

EXPLORER'S VOICE

Shackleton's dash to reach the South Pole is described by the explorer himself on an H.M.V. 78 r.p.m. record, which presents on the other side the voice of Peary, who tells how he reached the North Pole. The Antarctic Division has presented a Union Jack recovered from the hut at Cape Royds, and items from the National Museum collection include a set of man-hauling sledge harness, and a sledge meter and wheel from the 1914-1917 Imperial Trans-Antarctic Expedition. A brandy flask given by Shackleton to the donor's grandfather probably came from the same expedition.

Chine, glassware, and cutlery from early and later expeditions bob up periodically from unexpected places. Apparently members of some expeditions found plates, glasses, knives, forks, and spoons bearing crests or inscriptions were convenient and appreciated gifts to their friends.

LIQUEUR GLASS

A plate with the Discovery expedition's crest, made by Doulton, of Burslem, has been bought at auction by the museum. It has also received a dinner plate from Rear-Admiral Richard Byrd's 1928-1930 expedition. An unusual Amundsen relic deposited on loan is a small gilt-rimmed liqueur glass. The name "Fraum", Amundsen's ship still preserved in Oslo, is etched on the side.

Another unusual item associated with Scott's last expedition is a mirror mounted in plywood with a surround of skin from a Weddell seal. It was made by Demitri Gerof, the Russian dog driver, who worked as an assistant to Sir Joseph Kinsey's gardener, Harold Stemmer, after his return from the Antarctic. It has been loaned by Mr Stemmer's son.

PENNELL'S DIARY

Most of the diaries kept by members of the early expeditions are held by the Scott Polar Research Institute's library. But the Canterbury Museum now has the dairy of Lieutenant H. Pennell, master and navigator of the Terra Nova, with entries from January 26, 1911 to April 3, 1912. It has been lent by his nephew, Mr R.R.D. Pennell, who has also deposited on loan an album of 443 photographs, dated and titled, taken by Herbert G. Ponting, the expedition's photographer.

Modern exploration is represented in recent additions by a collection of dog harness (collar, bells, whip), sledging metters, and a roll of lamp wick from the Norwegian-British-Swedish 1949-1952 expedition to Queen Maud Land. It was presented by the Scott Polar Research Institute, whose director, Dr G. de Q. Robin, served with the expedition.

Samples of sledge biscuits used by field parties, man pemmican, and field party rations used by D.S.I.R. staff in the late 1950s are among New Zealand items. They were presented by the Antarctic Division.

Other items of the modern era include a selection of field clothing from American expeditions of the 1950s and 1960s, a canvas equipment bag from a New Zealand dog sledge, and harness used by a Scott Base husky named Apolotok in the 1974-1975 season.

WHALING COMMISSION REDUCES SOUTHERN SPERM QUOTA

Another call for a 10-year moratorium on all commercial whaling for all species or immediate protection for sperm whales was made to the International Whaling Commission at its 28th annual meeting in London. It did not accept the proposals, but it did reduce by more than half the quote of sperm whales that may be taken in the Southern Hemisphere in the 1976-77 season. The total catch of all species was set at 32,450 last season. This season it has been reduced to 28,450.

Sixteen nations were represented at the meeting — Japan, Britain, Soviet Union, the United States, Canada, Australia, Norway, Denmark, Iceland, South Africa, New Zealand, Brazil, Mexico, France, Argentina, and Panama. Of these nine — Argentina, Britain, Canada, Denmark, France, Mexico, New Zealand, Panama, and the United States, are non-whaling nations. New Zealand rejoined the commission this year after eight years' absence.

Since the United Nations conference on the human environment in Stockholm in 1972 called for a 10-year moratorium on all commercial whaling, repeated efforts have been made to persuade the commission to agree to the proposal. This year Sir Peter Scott, on behalf of the World Wildlife Fund, called for the moratorium to give all whale stocks a chance to recover. Pending a total moratorium, he asked for immediate protection of sperm whales because of grave uncertainties in the population assessments.

In the 1975-76 Southern Hemisphere season the quotas set by the commission for sperm and sei whales were not met. Whaling fleets failed to take more than 65 per cent. of the permitted quota of 10,740 for sperm whales.

Because of this indication that the sperm and sei whale populations were well below the levels assumed when quotas were set last year, the commission's scientific committee recommended a large reduction in the 1976-77 quota for female sperm whales. The commission accepted the committee's recommendation for the large reduction in the quota for all sperm whales.

In the new season the quota will be 4,791 (3894 males and 897 females). Last year the quota was set at 10,740 (5,870 males and 4,870 females). These will be shared by five whaling nations — the Soviet Union (2942), Japan (705), South Africa (597), Australia (526) and Brazil (21).

To protect breeding pods the commission imposed an embargo on the killing of sperm whales more than 45ft in length north of 40deg S. This embargo will apply from October to January inclusive.

Last year the commission reduced the sei whale quota by more than half, and the fin whale catch was cut from 1000 to 220. Evidence from last year's catch, and scientific expeditions indicates that fin and minke whale stocks are being depleted more rapidly than allowed for in the commission's calculations of the maximum sustainable yield. As a result the commission decided to make the fin whale fully protected in the Antarctic.

New quotas were set by the commission for fin, sei, minke and sperm whales in the North Atlantic; Bryde's, minke and sperm in the North Pacific, and sei and minke in the South Hemi-

sphere. In some cases quotas were decreased, and in others they were increased slightly, according to recommendations of the commission's scientific committee.

Four whale species are fully protected throughout the world. They are blue, humpback, gray, and right whales. Fin whales are protected in the Antarctic, the Southern Hemisphere, North Pacific, off the west coast of Norway, and off Nova Scotia. Sei whales are protected in the North Pacific and off Nova Scotia, and Bryde's whales in the Southern Hemisphere.

Japan and the Soviet Union, which account for the bulk of the world's whaling catch, have agreed on their national quotas of sperm whales as did South Africa, Australia, and Brazil. But their experts failed to agree on how to divide the quotas for sei and minke whales.

Under the commission's 90-day rule the member countries have until September 25 to object to any of the new quotas, in which case they will be exempt from observing them. Japan agreed reluctantly to the reduction of the total sperm whale quota, and has indicated that it will protest against the commission's decision to reduce quotas for the whales which form the bulk of her industry's catch.

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

BYRD'S MEN

Sir, — I was very interested in the letter signed James Pigg which appeared in your June issue.

I agree that it would be desirable to know the later history of all the New Zealanders who served with one or other of the Byrd expeditions, listed by L.B. Quartermain as an appendix to his book "New Zealand and the Antarctic". Unfortunately, the records of most of these people have become scattered and it would be difficult at this late stage to trace all of them.

I can, however, give information about a few people.

F.M. Paape, the son of the proprietor of the Grand Hotel in Dunedin, managed hotels there until 1966. Then he worked for the Ashburton Licensing Trust, and at one stage ran the Mount Somers Tavern. He died at Waikouaiti on September 18, aged 69.

A.B. "Lofty" Robinson, who gave the first talk to the newly-formed Dunedin Branch of the New Zealand Antarctic Society, was killed in World War II, and an obituary of him appeared in the "Polar Times".

Of the others, I can only record the lamentable intelligence that several have passed on. Those I know of are H.R. Young, Dr Louis Potaka, R.E. Round, and O.C. ("Alf") Brustad.

I hope these few notes will help to update the record.

Yours, etc.

ANTARCTICAN.

"ANTARCTIC"

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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 Dependancy, and has been involved in the establishment of a national Antarctic centre at the Canterbury Museum, Christchurch.

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 address, see below. The yearly membership fee is NZ$3.00 (or equivalent local currency). Membership fee, overseas and local, including "Antarctic", NZ$6.50.

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