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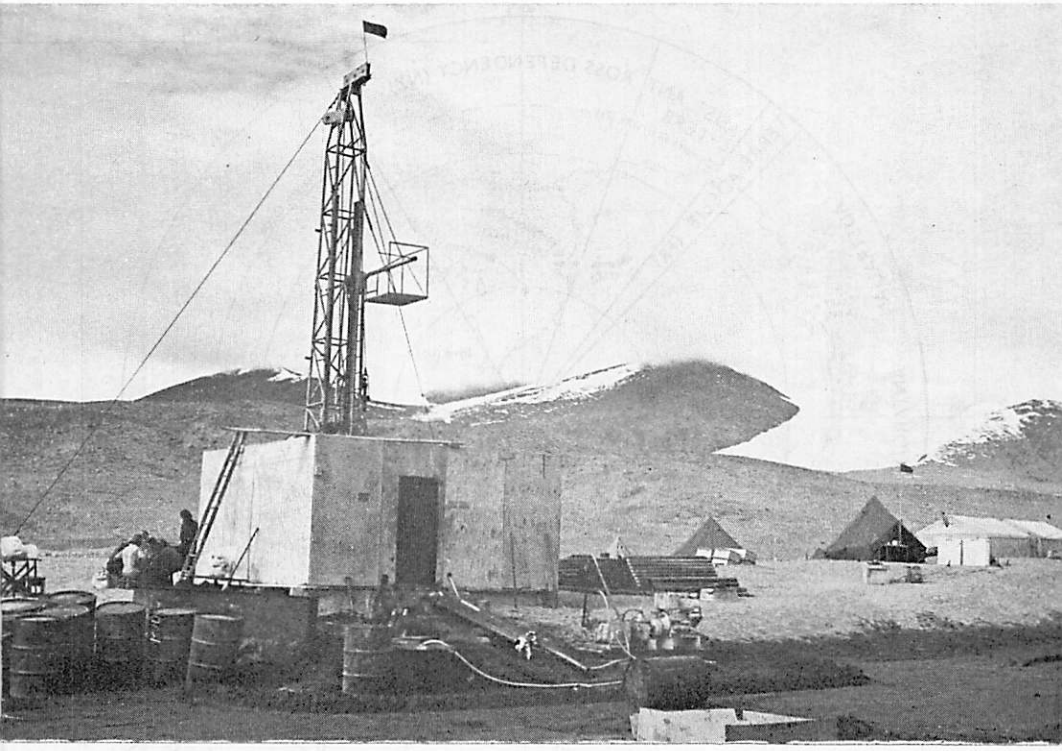

EQUIPMENT USED BY NEW ZEALAND DRILLERS IN THE INTERNATIONAL DRY VALLEY DRILLING PROJECT AT NEW HARBOUR, ABOUT FIVE MILES FROM LAKE FRYXELL AT THE EASTERN END OF THE TAYLOR VALLEY IN VICTORIA LAND. LAST SEASON A HOLE WAS DRILLED TO A DEPTH OF 157.31 METRES. ANOTHER HOLE WILL BE DRILLED THIS SEASON ONE KILOMETRE FROM THE PREVIOUS SITE.

Antarctic Division, D.S.I.R. Photo

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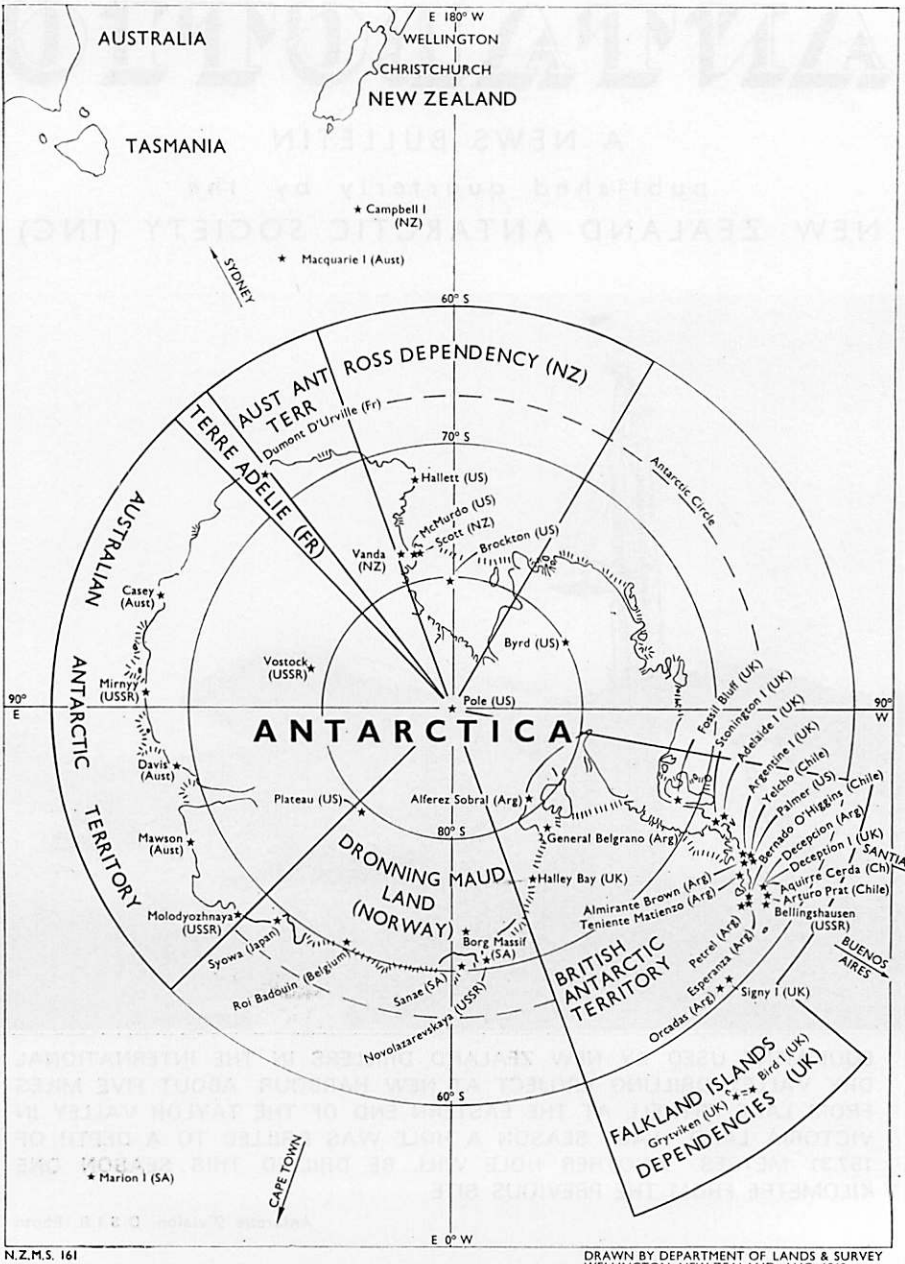

N.Z.M.S. 161

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In 1841 James Clark Ross sighted the "High Land," a mountain emitting flame and smoke in great profusion. He named it Mount Erebus, and wrote that "the discovery of an active volcano in so high a southern latitude cannot but be esteemed a circumstance of high geological importance and interest, and contribute to throw some further light on the physical construction of our globe."

This summer, New Zealand, French, and American scientists will make hazardous descents into the craters of Erebus to "throw some further light on the further construction of our globe." Let us hope they do not forget those who first braved the dangers of Erebus for science more than half a century ago.

SEA ICE DRILLING IN N.Z. PROGRAMME

Two major international projects—a descent into the craters of Mount Erebus, one of Antarctica's two known active)volanoes, and drilling through the sea ice into the bed of McMurdo Sound—are included in New Zealand's Antarctic research programme for 1974-75. New Zealand, French, and American scientists will participate in the Erebus project, and scientists from the United States, Japan, and New Zealand will be involved in the Dry Valley Drilling Project, a three-year programme developed by scientific organisations of the three countries.

New Zealand is responsible for all drilling operations needed in the project. Work was to have started early this month on the shoreline of New Harbour and then in McMurdo Sound. But the programme was delayed for five or six weeks by abnormally high tides in McMurdo Sound, followed by a fierce blizzard towards the end of last month.

PLATFORM LOST

Many square miles of 5ft thick ice in the sound were buckled and cracked by the tides, and then driven out by the blizzard. As a result the drilling platform in the sound was lost, and an American and New Zealand survey team was unable to reach New Harbour or Marble Point across the sound where the drilling rig was left for the winter.

Now the drilling team, led by the drilling superintendent, Mr J. Hoffman, will fly south early next month. Plans are for materials to be ferried across the sea ice, and for the survey team from Scott Base to mark the drilling sites on the sea ice in McMurdo Sound, and measure the currents at various depths. The drillers will spend two weeks at New Harbour, which is at the eastern end of the Taylor Valley, and then move into McMurdo Sound.

Drilling through annual sea ice 6ft to 10ft thick and in deep water has not been attempted before anywhere else in the world. The drillers, whose rig and equipment have been specially modified by Canadian experts, will have to cope with drifting ice, vertical and horizontal tide movements, and the currents. All the sites are above deep water, and at one the water is 900ft deep.

Four holes will be drilled in the sound, the first north-east of New Harbour, in 480ft of water. It is hoped to penetrate the marine sediments and drill into bedrock. The three other sites are south-east of the first.

When the drilling in McMurdo Sound is completed the team will return to New Harbour. There, another hole will be drilled one kilometre inland from last season's site. The move inland is to prevent heat flow measurements being affected by the water in McMurdo Sound.

SALTY LAKE

If the drilling programme can be completed at this stage before Christmas, the team will return to Don Juan Pond, which is in the Wright Valley about 80 miles west of Ross Island, and drill another hole there. Don Juan Pond's waters are so salty that it does not freeze even at temperatures of minus 70deg Fahrenheit.

Last season the drillers began drilling through sediment on the west side of the pond. They struck a granite boulder, and later water started to rise in the drill hole. Drilling was stopped because there was no way to control the flow, which might have contaminated the pond.

From the west side of McMurdo Sound the team will then move to Black Island, which is south of Ross Island, and projects through the ice shelf between Brown and White Islands to a height of about 3600ft. It was discovered in 1902 by Scott's expedition, and named because of the black volcanic rocks there. A hole will be drilled on the island to enable scientists to study the volcanics.

The drilling programme is expected to be completed late in February. On Ross Island the drillers will return to the hole drilled last season near the earth sciences laboratory at McMurdo Station. Then the hole was the deepest—378.7 metres—drilled on land in Antarctica. It was to have been taken deeper but drilling had to be stopped so the rig could be moved to Lake Vanda. This season the drillers will go as deep as they possibly can. Originally the hole was to have been taken to a depth of more than 900 metres.

THREE NATIONS

Scientists of three nations will work for nearly a month from a camp established at a height of 12,000ft on an old lava flow on the west side of Mount Erebus, which is 12,500ft high. Two Frenchmen and a New Zealander, wearing special heat-resistant clothing, will be lowered by winch into the inner crater of the volcano to collect gas samples and study the laval lake discovered in the 1972-73 season by a New Zealand party.

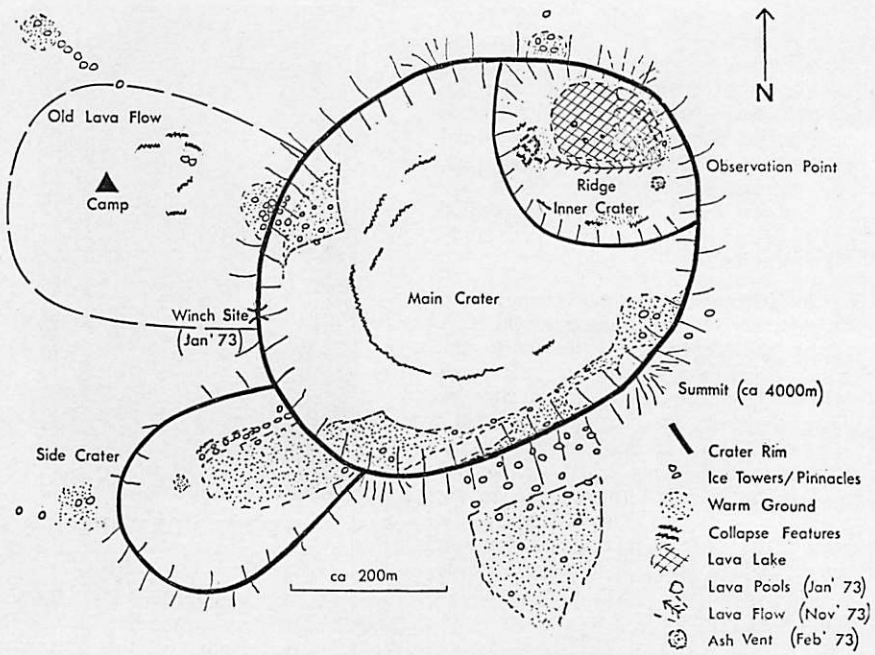
Early in December the team of six New Zealanders, six Frenchmen, and four Americans, will establish their camp with the aid of United States Navy helicopters which will transport all the equipment from McMurdo Sound and Scott Base 20 miles away. Another smaller camp may be established on the floor of the main crater of Erebus.

Field leader of the Erebus project is Mr Shaun M. Norman, who was deputy leader at Scott Base for two summers. In the French party is one of the world's

SHAUN NORMAN

foremost vulcanologists, Dr Haroun Tazieff. The New Zealanders include Dr W. F. Giggenbach, of the chemistry division, Department of Scientific and Industrial Research, who explored the main crater in 1972 with Mr J. Shorland, and Mr P. R. Kyle, a geologist from the Victoria University of Wellington, who suggested the expedition to Dr Tazieff. He has spent one month on Erebus during four summers in the Antarctic. Dr S. B. Travers, of the geology department, University of Nebraska, who has been associated with the Dry Valley Drilling Project, is in the American party.

When the camp is established, the expedition will lower a man by winch down the steep wall of the main crater to the flat floor 300ft below. Then a walkway with hand ropes will be built. Four winches will be used, two to lower heavy equipment from the rim of the main crater, and the others to lower men and equipment into the inner crater. Dr Tazieff, his assistant, and Dr Giggenbach will work at a depth of 400ft just above the laval lake which has an estimated temperature of 11000deg Fahrenheit.



A sketch map of the summit of Mount Erebus, and the main and inner craters of the active volcano, where scientists of three nations—New Zealand, France, and the United States, will work this season. Descents will be made into both craters for vulcanological studies.

A programme of vulcanological studies will include sampling gas and molten lava from the lake, and recording temperatures. Geologists will work inside the main crater and on the outside of the volcano, and two seismographs, one on the rim of the inner crater, and the other several hundred yards below the main camp site will provide continuous readings to check on small eruptions. A topographical survey will be made to check for signs of decay in the crater walls, and measurements will be taken to establish how far the laval lake is below the inner crater's rim.

As far as is known there are only four volcanic laval lakes in the world. Study of the Erebus lake will help scientists to determine whether volanic activity is increasing or decreasing, and whether such activity goes in cycles.

SUB-ANTARCTIC MAPS

Existing maps of New Zealand sub-Antarctic islands are being brought up-to-date by the Lands and Survey Department in collaboration with the Royal New Zealand Air Force. The R.N.Z.A.F. has taken photographs from Orion aircraft during reconnaissance flights over the sub-Antarctic groups, and these will be used in the preparation of topographical maps showing contours, reefs, rocks, and shoals.

Several scientific expeditions have visited the islands in recent years, and there have been calls by ships of the United States Navy's Antarctic support force on their way to the Antarctic.

Field Projects for Summer

New Zealand's Antarctic research programme this summer will be carried out by a support staff of 140, including guest scientists from three countries, and two women. Research will be conducted by scientists from six New Zealand universities, the Ministry of Works, the Geological Survey, the Oceanographic Institute, the Physical Engineering Laboratory, and the Antarctic Division, Department of Scientific and Industrial Research.

These men, and the two women, will work at or from Scott Base, Vanda Station, and Cape Bird, in the Bowers Mountains of Northern Victoria Land, on the Ross Ice Shelf, in the Darwin Mountains, and in McMurdo Sound. New Zealanders will work with the Americans on a joint upper atmosphere programme at Siple Station, and in the Ross Ice Shelf Project.

Miss Joy Woods will return to the Antarctic for a second season to do more study of the ecology of freshwater lakes with the University of Canterbury party at Cape Bird. The second woman to go south this season will be Mrs Jo Knight. She and her husband will study the nutrients and productivity of onshore waters at Cape Bird.

LONG TRAVERSE

A major project in the summer programme will be a 1000-mile traverse by two parties in the Bowers Mountains and the Evans Neve in Northern Victoria Land. The four-man parties will be flown into the area and out again by Hercules aircraft of the United States Navy's VXE6 Squadron. Both parties are from the Geological Survey.

Vanda Station, in the Wright Valley, which has been a summer station since 1970, was occupied this winter. This season it will become a summer station again, and will meet the needs of field parties working in the dry valleys. Geomagnetic and meteorological research programmes will be carried out by the station staff.

Nine men will work at Scott Base during the summer. They will continue the research programmes, which include geomagnetism, meteorology, ionospheric physics, and seismology. Research will also be conducted at Arrival Heights into geomagnetism and the aurora.

SCOTT BASE

John F. Stanton (28), Christchurch. Deputy leader. He is training officer for the Christchurch combined civil defence organisation, and has hard rock mining and road contracting experience.

William R. Sloan (28), Christchurch. Storekeeper.

Kevin P. Riddell (28), Invercargill. Maintenance carpenter.

Eric J. Stevens (25), Christchurch. Assistant maintenance officer.

Eric J. Saxby (37), Springfield. Assistant maintenance officer.

Nicholas L. Round Turner (28), Mosgiel. Information officer.

Kenneth J. Dawson (20), Wellington. Assistant postmaster.

John M. Rennie (21), Kaikoura. Radio technician.

G. L. Money, Christchurch. Radio technician.

VANDA STATION

Frederick D. Coe (47), Rotorua. Leader. He is a secondary school teacher with extensive mountaineering, and search and rescue experience.

Graham C. Callander (29), Hamilton, Technician.

M. Hodgson, Auckland. Meteorologist.

P. Bruce, Wellington. Meteorologist.

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

Ministry of Works and Antarctic Division. Glaciology and hydrology in the dry valley area. T. Chinn, leader; P. Mason, hydrologist; W. C. King, field assistant; J. F. Williams, surveyor.

Geological Survey. (1) Stratigraphy and sedimentology, Bowers Mountains. M. G. Laird, leader; J. Bradshaw, T. Wodzicki, geologists; I. Curphey, field assistant. (2) Palaeontology and geochronology, Evans Neve, Bowers Mountains. R. A. Cooper, leader; J. Jago, J. Simes, geologists; P. Braddock, field assistant.

Erebus vulcanological studies. New Zealand. S. M. Norman, leader; W. Giggenbach, P. Kyle, geologists; R. Dibble, seismologist; J. R. Keys, chemist; R. Rainsbury, field assistant; M. E. Lambert, New Zealand Press Association. France. H. Tazieff, F. Le Guern, J. Carbonelle, J. Le Bronec, vulcanologists; K. Stauffer, winchman. United States. S. B. Treves, geologists; P. Paffit, film cameraman.

Dry Valley Drilling Project. J. Hoffman, drilling superintendent; D. Murphy, E. T. Ramsden, D. Lang, M. Williams, J. Tanner, T. Griffiths, N. J. Stephenson, J R. Oldridge, B. Graham, E. Blackwell, L. Olliver, J. Gupwell, D. McLeod; M. J. Gillies, K. T. Murray, D. Murray, drillers; R. W. M. Wills, field assistant; L. F. Todd, cook.

Oceanographic Institute. Current and temperature measurements at selected sites in McMurdo Sound. B. Shakespeare, leader; N. J. Swindells, field assistant. Antarctic Division. Continuation of annual population study of Weddell seal in McMurdo Sound. S. M. Norman, leader.

Physical Engineering Laboratory. Upper atmosphere joint programme with United States, Siple Station. C. J. Sloan, leader; E. Stringer, tecnician. Institute of Nuclear Sciences. Monitoring programme by technical staff at Scott Base to determine increase in concentration of carbon dioxide in the atmosphere.

Commonwealth Scientific and Industrial Research Organisation, Australia. Collection of air samples from aircraft flying to and in the Antarctic. Samples will be analysed by the C.S.I.R.O. to determine the vertical and horizontal distribution of carbon dioxide.

Antarctic Division. Penguin count at Cape Royds. J. A. Newman, leader. Search and rescue training programme with Royal New Zealand Air Force team. J. A. Cowie, leader; W. C. Freaney, R. W. M. Wills, field assistants.

Antarctic Division and Victoria University of Wellington. Physiological and psychological studies of winter team at Scott Base. Professor A. J. W. Taylor, professor of clinical psychology, Victoria University.

Staff at Scott Base will conduct a study for the University of Canterbury of the amount of atmospheric corrosion of exposed aluminium strips.

FIELD PROJECTS

New Zealand and United States scientists will work together in other projects of the New Zealand programme, apart from the Mount Erebus expedition, and the Dry Valley Drilling Project. A French scientist is expected to work with the University of Canterbury party at Cape Bird.

Dr A. deBries, of the physiological research laboratory, Scripps Institution of Oceanography, University of California, has invited Mr D. Tattle, of the University of Canterbury, to work on a zoological programme at the Eklund Biological Centre, McMurdo Station. Dr A. Watson, department of physiology, and anatomy, Massey University, will work with Dr D. Siniff, University of Minnesota, on the anatomical, histological, and neuro-anatomic study of Antarctic seals, which has been conducted from McMurdo Station since the 1971-72 season.

An American geologist, Mr P. Mayweski, and an assistant, plan to accompany the New Zealand Geological Survey parties which will work in the Bowers Mountains Northern Victoria Land.

WINTER TEAM AT SCOTT BASE

Ten men have been selected to winter at Scott Base through 1975. The leader is Mr J. A. Newman, a company secretary, who is a former Royal New Zealand Navy electrical engineering specialist. He is an experienced mountaineer.

Most of the men in the new team come from the North Island. Four are married and six are bachelors. There is one 19-year-old, and the ages of the others range from 22 to 41.

Members of the winter party are:

James Newman (41), Auckland. Leader (see "Antarctic", June, 1974, Page 44).

Bernard P. Sussmilch (34), Waiouru Military Camp. Base engineer. He is an A grade mechanic, who joined the Army in 1958, and has served in Thailand.

Garry C. McCullough (28), Waiouru Military Camp. Fitter-mechanic. He is a fitter and turner, and joined the Army in 1963.

Robert M. Kitchener (27), Arapuni. Fitter-electrician. He is a maintenance electrician with the New Zealand Electricity Department.

Kenneth W. Parker (23), Christchurch. Cook. He joined the Royal New Zealand Air Force in 1968, and is a cook at Wigram.

David G. Hope (25), Auckland. Technician. He is in the electrical section of the Post Office workshops at Newmarket, Auckland.

Peter L. Jemmett (22), Auckland. Technician. He is a telegraph technician in the Post Office Engineer's Office at Auckland.

Craig R. Nickerson (19), Waiouru Military Camp. Technician. He is an electronics technician, and joined the Army in 1969.

Alan L. J. Campbell (31), Invercargill. Postmaster. He is supervisor of the telegraph branch in the Invercargill Post Office.

Allan Hardie (34), Napier. Radio technician. He is a radio technician with the Post Office.

JAMES NEWMAN

Storms topple cross

Two violent storms this winter combined to topple the 9ft jarrah wood cross erected on Observation Hill, overlooking McMurdo Station, in memory of Captain Scott and the men who died with him on the return journey from the South Pole. The cross, placed on the summit of the 830ft hill 61 years ago, has been on the lean for some years, mainly because of some movement at the base, and batterings by the wind.

In July this year one storm tilted the cross even further; the second last month blew it down. This month a team from Scott Base plans, when the weather is favourable, to climb the hill and re-erect the cross. Later this summer the Antarctic Division, Department of Scientific and Industrial Research, proposes to reset the cross in a concrete base on its present site.

Six universities involved in N.Z. field projects

Field work inside and outside the craters of Mount Erebus, geological studies in the Darwin Mountains, and a seismic profiling survey in McMurdo Sound from an icebreaker, are included in the projects which will be carried out by university scientists during the New Zealand Antarctic research programme this summer. All the New Zealand universities—Auckland, Waikato, Victoria, Massey, Canterbury, and Otago —are involved in this this season's programme, and field parties will study Weddell seals, the ecology of freshwater lakes, marine life, and glacial deposits in the dry valleys. Some scientists will take part in United States projects.

Eleven scientists in Victoria University's 19th expedition will work on six separate projects. These include the Mount Erebus expedition, the Dry Valley Drilling Project, the Ross Ice Shelf Project, and studies of the basal Beacon and late Cenozoic stratigraphy, and of saline deposits. The field leader is Mr J. R. Keys. Ph.D. student in chemistry, and the scientific leader is Mr C. G. Vuceitch, reader in pedology.

Three scientists will work with the Erebus expedition, which was initiated by Mr P. R. Kyle. Mr Kyle has spent four previous summers doing field work for his petrographic and chemical study of the McMurdo volcanics, of which Mount Erebus is a part. Dr R. R. Dibble, a geophysicist, will record seismic activity to compare with his observations of activity in the crater over the one month period.

SALT DEPOSITS

Mr Keys will continue the mapping and collecting of saline deposits in the McMurdo region by working in detail around the summit and in the crater of Erebus. All three scientists will work inside and outside the craters, and will assist the French vulcanologists and other scientists working there.

Mr C. G. Vucetich and Mr P. H. Robinson will visit several critical localities in the dry valleys to extend the correlation and improve the chronology of the glacial deposits there. Soil studies alone seem unable to provide a much-needed basis for improved correlation and chronology, and tracing out of stratigraphic marker horizons is required.

Mr R. W. Plume will investigate in detail the New Mountain Sandstone, the oldest formation in the Beacon Supergroup, to establish its environment of deposition and, if possible, its age. The marine versus non-marine character of the lower Beacon has been debated for many years, and fossils from which an found. Mr Plume is at present studying one locality in detail. He intends to extend this study to other known exposures of he formation. Mr Keys will accompany Mr Plume to extend the study of saline deposits into previously age can be established have yet to be unvisited areas.

Dr P. J. Barrett, geologist and director of the university's Antarctic Research Centre, and Mr R. D. Powell will spend some time with the Dry Valley Drilling Project studying core from the McMurdo Sound drill holes. Later they will process samples for grain size analysis, magnetic measurements and pebble characteristics. The results should reveal a record of advancing and retreating ice, and will help date these events.

In addition, they hope to spend up to two weeks at the Crary Ice Rise in the middle of the Ross Ice Shelf, examining sediment frozen in the ice and revealed by crevassing. The aim is to find how the sediment was incorporated in the ice and where it came from. Dr Barrett and Mr Powell will also spend ten days with Mr Plume, working on the New Mountain Sandstone.

A seismic profiling survey is planned for McMurdo Sound by Professor D. A. Christoffel, a geophysicist, and Mr D. J. Northy and Mr C. Brown, graduate students in geophysics. They will operate from an ice-breaker, first covering the area of the two drill sites in McMurdo Sound, but hope to extend the survey to the whole ice-free part of the sound.

The results should allow the layers recognised in the drill holes to be traced out laterally. In addition, the knowledge of sediment thickness in the sound, obtained by the profiling, will be important in establishing the nature of the boundary between the Transantarctic Mountains and the Ross Sea.

CAPE BIRD WORK

This summer the activities of the University of Canterbury unit will be concentrated at Cape Bird station. They will involve seven people for varying periods.

The station will be opened by Mr P. Sagar, an M.Sc. student, who will be going south for the third time. In the early part of the season before his return to New Zealand he will continue his studies on the ecology and feeding of the common bottom dwelling amphipod, Paramoera walkeri. For the rest of the season the party will be led by Mr K. Duncan, senior lecturer in zoology. He will conduct physiological studies of cold-adaptation in marine invertebrates.

Miss Joy Woods, an M.Sc. student will return for a second season to carry out further study on the ecology of freshwater lakes. Live specimens of the common red rotifer.

A husband and wife team, Mr G. Knight, a Ph.D. student and Jo Knight, B.Sc., will study the nutrients and productivity of the onshore waters. In particular the influence of runoff from penguin colonies on nutrients and primary productivity will be investigated.

Dr R. M. Kirk, senior lecturer in geography, and Mr D. Harrowfield, a technician, will, in the latter part of the season conduct studies on beach formation and the recent glacial history of the area at Cape Bird.

WAIKATO PARTY

Scientists from Waikato University's research unit will investigate the chemistry, physics and sediments of Lake Wellman in the Darwin Mountains. They will also study geochemistry, geomorphology, and limnology in this area. In the dry valleys they will investigate the geochemistry, physics, and sediments of lakes, including an intensive study by sounding and coring Lake Fryxell.

Members of the team are: Professor A. T. Wilson, Dr C. H. Hendy, Messrs T. Healy, M. Grimstead, A Bonney, and P. King.

A joint New Zealand and United States project will be a microbiological and medical study of the resistance to infection of isolated groups working in Antarctica. The study will be conducted by Professor J. A. R. Miles, professor of microbiology at Otago University, who has previously made similar studies in tropical areas.

An Auckland University team, Dr J. A. McDonald (leader) and Mr D. Ensor (scientist) will be involved in another joint New Zealand-United States project. They will investigate the noural function in the sensory and motor nerves of one of the Antarctic fishes in McMurdo Sound.

Eruption on Mount Erebus continues for six hours

Mount Erebus, one of Antarctic's two known active volcanoes, erupted on September 4. The eruption lasted six hours, and was reported to be more violent than activity in the crater during recent years. A grey eruptive cloud which reached a height of about 1000ft replaced the familiar white plume of steam at the summit of the 12,450ft volcano.

Dr S. B. Treves, of the University of Nebraska, one of the geologists who will take part in the three-nation expedition which will descend into the craters of Erebus in December, observed the eruption from the window of the earth sciences laboratory at McMurdo Station, about 45 miles away. He reported that rocks were hurled from the crater into the rapidly growing dark cloud of ash—an indication that volcanic "bombs" were produced in the eruption.

In the last two seasons Dr Treves and Mr P. R. Kyle, a New Zealand geologist from the Victoria University of Wellington, have studied the inner crater of Erebus. They have found intensified activity within the crater.

HIGH ISLAND

Since men first lived on Ross Island more than 70 years ago there has been no activity from Mount Erebus to equal that observed in 1841 by Sir James Clark Ross and the men of the Erebus and Terror. When first sighted on January 27 the land was first called High Island, but, in the words of Ross, proved to be a mountain 12,400ft elevation above the level of the sea, emitting flames and smoke in great profusion.

In the story of the voyage Ross says that at 4 p.m. on January 28 Mount Erebus was observed to emit smoke and flame in unusual quantities, producing a most grand spectacle. A volume of dense smoke was projected at each successive jet with great force, in a vertical column, to the height of between 1500 and 2000 feet above the mouth of the crater, when condensing first at its upper part, it descended in mist or snow, and gradually disperses, to be succeeded by another splendid exhibition of the same kind in about half an hour afterwards although the intervals between the eruptions were by no means regular.

The diameter of the columns of smoke was between two and three hundred feet, as near as we could measure it, says Ross; whenever the smoke cleared away, the bright red flame that filled the mouth of the crater was clearly perceptible; and some of the officers believed they could see streams of lava pouring down its sides until lost beneath the snow which descended from a few hundred feet below the crater, and projected its perpendicular icy cliff several miles into the ocean.

Chess is a favourite winter pastime in the Antarctic, and matches are played by radio between teams representing several nations. This winter the American McMurdo Station team, led by a Russian exchange scientist, played against teams in New Zealand, on Campbell Island, at the Amundsen-Scott Pole Station, Molodezhnaya, the main Soviet station, and Vostok, the only Russian inland station.

Five New Zealanders meet high on Mount Newall

For the first time other than in the summer season, Vanda Station, New Zealand's small scientific outpost in the Wright Valley, 80 miles west of Scott Base, was resupplied with urgently needed scientific and medical equipment. Three men from Scott Base met two from Vanda Station on the slopes of Mount Newall. Their meeting took place on Black Friday, but it was a bright day for the five men—they had not seen each other for more than six months.

Messrs R. Newland and T. Smith left Vanda Station on September 11, and tramped along the Wright Valley against a stiff wind and temperatures of minus 41 deg to a refuge hut on the Messerve Glacier. They moved on September 12 to another hut at the foot of Mount Newall, which is more than 600ft high. At night they examined the inland terminal of the Wilson Piedmont Glacier over which the Scott Base party was to travel.

Messrs H. W. E. Jones (leader), R. Colliver, and M. Wing, drove a light tracked vehicle across the sea ice of McMurdo Sound and over the coastal snow fields to a hut at Marble Point on the seaward side of the Wilson Piedmont Glacier. For part of the way they acted as guides for a United States party from McMurdo Station which travelled to inspect the drilling rig for the Dry Valley Drilling Project at New Harbour in the eastern Taylor Valley.

With a heavier vehicle the Americans were able to carry a drum of fuel from which the New Zealanders refuelled their vehicle before moving on. On September 13 the Scott Base party drove up a steep snow slope and on to the Wilson Piedmont Glacier.

Two hours later, after many anxious moments weaving through suspect areas on the inaldn side, Mr Newland was seen standing on a distant snow slope. Mr Smith had remained below in an effort to make radio contact but this was prevented by a radio blackout.

Fifteen minutes later, the supplies were passed over at a height of 2000ft. There was time only for brief greetings before the two groups parted.

By 9 p.m. the Scott Base party had rejoined the Americans. Together they covered the 80 miles back to Scott Base.

The two men from Vanda Station remained overnight in the hut at the foot of Mount Newall. Then with heavily loaded packs they trekked back to the Station on September 14.

U.S. task force commander

Captain E. W. Van Reeth has assumed command of the United States Navy's Antarctic support force. He succeeds Captain A. N. Fowler, who has held the post for the last two years, and will be the ninth naval officer to command the support force since 1955.

Captain Fowler has retired from the Navy after 28 years service. He is still associated with Antarctic operations for he is now deputy head, Office of Polar Programmes, in the National Science Foundation.

Captain Van Reeth is a former commander of Antarctic Support Activities, and has served at McMurdo Station. Since early in 1972 he has been associate manager of polar operations in the Office of Polar Programmes.

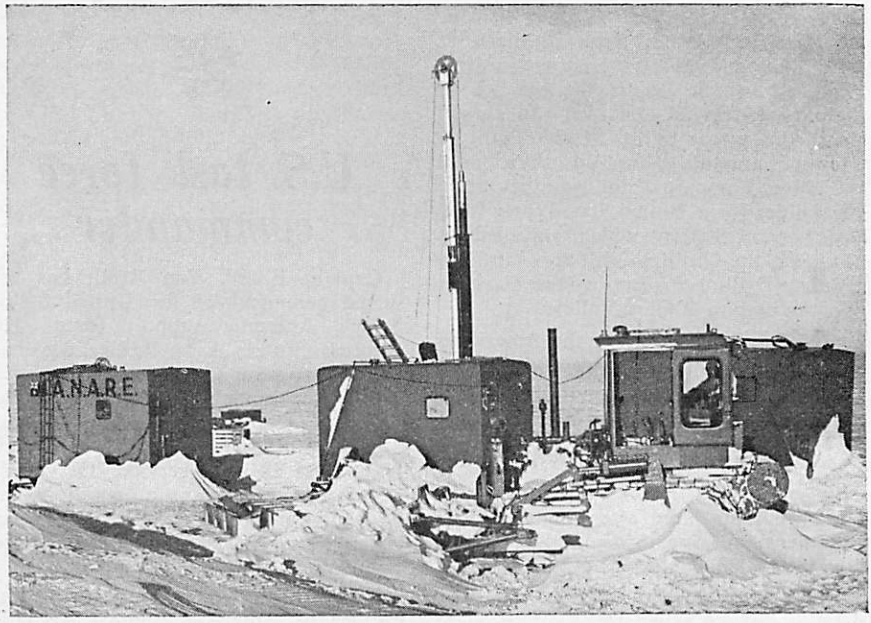
A.N.A R.E. REPORT

Deep ice-core drilling project near Casey

A deep ice-core drilling project for glaciological studies of the ice-sheet near the coast and inland has been the major event in the winter programme at Casey. Early in the winter a field party core drilled a hole to a depth of 350 metres several kilometres upstream from the previous Cape Folger hole where the ice is about 450 metres thick. Later another hole will be drilled inland to a depth of about 500 metres.

Deeper penetration of the hole was prevented by part of the drill sticking to the side near the bottom. In 1969 a hole was cored to 350 metres, reaching very close to bedrock. The core was obtained but the lower part of the hole was lost because of the rapid deformation.

This year's hole was logged for temperature and inclination changes, and the ice core will be returned to Australia for detailed analysis. Comparison with the previous core should enable significant events in the past climatic record to be separated from local and random variations.



A thermal drill developed by the Antarctic Division, Australian Department of Science, on the Polar Plateau near Casey. The drill was used for a deep ice-core drilling project near the coast this winter.

Australian Antarctic Division Photo: Murray Price

After repairs and maintenance of some of the equipment the field party will return to the drill site and attempt to drill another hole further inland to a depth of about 500 metres, as near as possible to bedrock. Drilling will have to be done quickly to prevent the bore-hole from closing under the weight of the ice.

The object of drilling this hole is to study the in situ deformation of the ice sheet right through to bedrock. To do this it is planned to fill the drill hole with fluid immediately after drilling to prevent closure.

The shearing deformation of the ice can then be measured by logging the drill hole with a precise inclinometer developed by the Antarctic Division, Department of Science, to detect the slow tilting of the drill hole caused by the ice motion.

Holes are drilled with a thermal drill developed by the Antarctic Division. It operates with a drilling head which melts an annulus of ice and extracts a core about 1½mm in length together with the melted water. The head is supported by a cable which carries the electrical power and can lower the drill to a depth of 500 metres.

In 1969 two previous holes were drilled on Law Dome near Casey. The ice cores were successfully extracted and part of them returned to Australia for analysis.

These cores have already revealed important climate changes that have taken place since the last ice age. The cores provide a valuable record of the precipitation and fallout over long periods of time.

The oxygen isotope ratios of the ice provides an important indication of past climatic variations. In addition, the cores allow a direct study to be made of the crystallographic and flow properties of the ice which govern the motion of the ice sheet.

The base of the ice sheet is particularly interesting because it contains the oldest ice. This region is also the highest in temperature and is generally undergoing the most rapid deformation. This makes drilling through to bedrock a most hazardous operation.

Antarctic conservation trophy

The Antarctic Conservation Trophy has been awarded this year to Mr B. N. Norris, of Christchurch, for his work as a ranger for the Lands and Survey Department's outlying islands committee. Mr Norris was a member of the Antarctic tourist expedition aboard the Lindblad Explorer last summer, and during the cruise studied the protection of flora and fauna on some of New Zealand's sub-Antarctic islands.

The award was announced last month by Mr S. W. M. Smith, chairman of the Canterbury branch of the New Zealand Antarctic Society. The branch has made two previous awards of the trophy — a 17in carving of an Emperor penguin in African walnut. The trophy is awarded to any person or organisation contributing to the conservation of historic buildings or flora and fauna in the Antarctic or the sub-Antarctic islands.

Mr Norris was a member of the Antarctic Society's team which did restoration work on the historic hut at Hutt Point, Ross Island, in 1964. He is also an honorary wildlife warden for the Department of Internal Affairs.

Mr R. B. Thomson, superintendent of the Antarctic Division, Department of Scientific and Industrial Research, described the work done by Mr Norris as outstanding, and said it fully met the conditions of the award.

Mr Norris also received a conservation citation from the National Conservation Week campaign committee last month. The citation was for his consistent advocacy of measures for a healthier environment, and in particular for his dedicated voluntary work in the rehabilitation of injured or disabled wild birds.

U.S. operations start with McMurdo Sound flights

United States operations in the Antarctic for the 1974-75 season began early this month when two ski-equipped Hercules aircraft brought mail, milk, fresh fruit, and vegetables to the men—and two women—of the winter party at McMurdo Station. The aircraft made three flights to McMurdo Sound breaking the isolation of more than 130 Americans, Russian and Polish exchange scientists who, since February 22, have endured four months darkness, blizzards, and bitterly cold weather.

In three flights the United States Navy VXE6 Squadron aircraft carried more than 15 tons of supplies and 80 passengers south. The passangers included scientists who will make an early start on research projtects, and 20 Navy construction workers, meteorologists, equipment operators, mechanics, and air traffic controllers who will prepare the Williams Field ice runway for flights by the United States Air Force Starlifters which will take the summer support and scientific staffs south, starting next month.

TWO WOMEN

On the first flights the two aircraft left Christchurch at 12.40 a.m. and 1.40 a.m. on September 2, carrying 31 scientists—two of them women—4810lb of mail and 3000lb of fresh food. The women were the Taiwan-born wife of Dr A. L. DeVries, of the Scripps Institution of Oceanography, and Miss Marilyn Guin, of the University of Oregon. Dr DeVries and his wife have been studying the biochemistry of freezing resistance in Antarctic fishes for several seasons.

When the aircraft landed in the twilight of Williams Feld at 8.5 a.m. and 9.15 a.m., the weather was fine but the temperature was minus 42deg Fahrenheit. On the first and last flights back to Christchurch the aircraft brought two women—the first scientists of their sex to winter in the Antarctic. They were Dr Mary A. McWhinnie, professor of biological sciences at DePaul University, Chicago, and Sister Mary Odile Cahoon, professor of biology at St Scholastica College, Duluth, Minnesota.

Dr McWhinnie returned on the first flight. She accompanied the body of Mr G. W. Nickell, former manager of the McMurdo Station biological laboratory. He was killed on May 16 in a truck accident on the road between Scott Base and the station.

All the flights except the last were completed without incident. The Winfly operation ended on September 4 when a Hercules flew nearly 2200 miles to Christchurch on three engines. Power and propeller surges in one engine developed moments after the aircraft left McMurdo Sound.

With favourable winds expected, the aircraft commander, Lieutenant-Commander J. Paulus, who has been on the Antarctic run for five years, decided to continue the flight to Christchurch. Normally the journey would have taken six hours and a half; with one engine shut down it took three hours more. The aircraft landed with enough fuel left for three hours flying.

For more than half the flight the Hercules was accompanied by a search and rescue Hercules which had flown to 60deg S. The crew of this aircraft remained in the air for 13 hours until assured that the crippled aircraft had landed safely.

One New Zealand scientist flew south this month. He was Mr I. L. Thomas, a physicist from the auroral station at

Lauder, Central Otago, who will study the aurora.

Among the United States scientists on the Winfly flights was Dr Joseph A. Warburton, of the Desert Research Institute, University of Nevada. He and his party will study the major chemical constituents of snow, and precipitation forming mechanisms on the Ross Ice Shelf.

Scientists from the Scripps Institution of Oceanography, University of California, led by Dr DeVries, will continue studies of the physiology and biochemistry of freezing resistance in Antarctic fishes. This year's project will concentrate on how the glycoprotein antifreezes in the fishes' body fluids protect them in their icy environment.

The effect of temperature acclimatisation on the oxygen capacity of the blood of the large Antarctic cod (Dissostichus mawsoni) will be studied with Drs W. Zapol and J. Quist, of the Boston General Hospital and the Gentofte Hospital, Copenhagen, respectively.

Research begun in 1967 will be continued and expanded by a party led by Dr Paul K. Drayton, of the Scripps Institution of Oceanography. The scientists will study sponges and starfish in McMurdo Sound, and the development of soft bottom communities in the area.

Dr Samuel B. Treves, of the department of geology, University of Nebraska, flew south with three students to take part in the Dry Valley Drilling Project. Later he will join the Mount Erebus expedition, and then serve as site geologist for the drilling of the volcanic rocks on Black Island, and the deepening of the DVDP third hole drilled on Ross Island.

In their six months' isolation the McMurdo Station community faced a severe winter of blizzards, heavy falls of snow, and low temperatures, as well as four months of darkness. The winter took its toll of the station's buildings. Some were torn apart and destroyed, and others were severely damaged by a storm early in July when the wind reached 125 miles an hour.

McMurdo Station's long, dark winter began on April 24 when the sun dropped below the horizon and the light steadily grew less.

Although the sun rose on August 21 the weather did not improve. During the month another blizzard with winds up to 90 knots drove many square miles of ice out of McMurdo Sound.

Orion delivers winter mail

Early last month men — and two women — of four nations wintering in the Antarctic received mail from home for the first time since February instead of waiting for it until the United States Navy's Winfly flight early this month. The winter mail delivery was made for the second successive year on August 8 by a Royal New Zealand Air Force Orion of No. 5 (Maritime) Squadron, which flew 4500 miles non-stop in 12 hours from Dunedin to McMurdo Sound and back.

High winds and poor visibility in the McMurdo Sound area prevented the mail being dropped on August 7. The Orion, piloted by Flight Lieutenant D. W. Paulson, left Dunedin on its navigational exercise at 7 a.m. It had to return after having flown 900 miles south because of the bad weather.

Nine canvas mail bags attached to small parachutes were dropped from the afternoon of August 8 above the ice runway of Williams Field, which was illuminated by field generators. Inside the bags were letters, newspapers, and tape recorder cassettes with personal messages for the 11 New Zealanders at Scott Base, and 143 Americans, and Russian and Polish exchange scientists, at McMurdo Station.

When the Orion left Dunedin at 7.42 a.m. it carried 1100lb of mail, and some scientific equipment, the total weight being 1362lb. The aircraft was over Williams Field at 1.30 p.m. and was spotted by the ground crew two minutes later.

Women scientists enjoyed first Antarctic winter

Eight months' isolation in the Antarctic—except for the company of more than 130 men—did not upset Dr Mary A. McWhinnie and Sister Mary Odile Cahoon, the first American women scientists to stay there all winter. When they returned to "civilisation" early this month they agreed that their winter at McMurdo Station was the happiest they could remember, and both said they would be delighted to return if they had the opportunity. They were in the Antarctic to work, and found the winter the best time for sustained, steady work on their project.

KRILL STUDIES

Dr McWhinnie, professor of biological science at DePaul University and Sister Cahoon, professor of biology at St Scholastica College, Duluth, Minnesota, flew south in January to study krill, the shrimp-like crustacean endemic to Antarctic waters. They worked with three other scientists, including a Polish exchange scientist, Dr S. Rakusa-Suszcewski, taking samples from the water under the ice near McMurdo Station. Studying their finds occupied most of the long dark hours of the Antarctic winter.

Both women believe that the work they accomplished is important in disclosing the mechanism of low temperature adaptation by a wide range of marine organisms—relatives of jellyfish to higher fish, including several crustaceans such as krill and starfish. Their work on krill will not encourage or discourage the commercial exploitation of Antarctic biological resources.

Neither of the women had any misgivings at any time about spending eight months in anisolated all-male community. The men accepted them, and were very kind and generous, according to Dr McWhinnie. She says that scientists are scientists whatever their sex, and there is no reason why healthy women should not cope with Antarctic winter conditions.

Dr McWhinnie, who celebrated her 52nd birthday on Ross Island, and Sister Cahoon, who is 44, had little leisure time. Sister Cahoon put on her skis for a run only once, and she did not get nearly as much knitting done as she thought she might. Both women gave lectures on aspects of their work. What little spare time Dr McWhinnie had she used for reading.

Although isolated, the women were not completely cut off from the outside world. They were able to talk to friends in the United States by the ham radio system until the sun set in April, and voice contact was lost for two months. Then they used radio telegrams, all at the station being allowed two messages of 100 words each week to send home at no cost. Friends were able to reply the same way at ordinary postage rates.

McMurdo Station has closed circuit television, a bowling alley, wide screen films, and a good library. But there is no women's hairdressing salon. This did not worry Dr McWhinnie and Sister Cahoon. They made do with neat haircuts from the station barber.

One of the 26 men wintering at Mawson Station was killed in a tobogganing accident close to the the station on March 24. He was Geoffrey Maxwell Cameron, senior carpenter ol the Australian National Antarctic Research Expedition, who lived at North Williamstown, Victoria.

There are now 83 men wintering at Australian stations. Mawson has 25, Casey 25, and Davis 14. There is a staff of 19 on Macquarie Island.

BRITISH SURVEY NEWS

Stonington Island Base to be closed after 21 years

The British Antarctic Survey base on Stonington Island in Marguerite Bay will be closed at the end of the 1974-75 summer. It has been occupied from 1946 to 1950, and then from 1958 to date—21 years in all. Almost all the work that can be done most efficiently from the base has been completed, and it is being closed because there is a pressing need for economy.

Stonington Island may still be used during the summer, but in future most field work in the Marguerite Bay area and further south will be undertaken by summer parties operating from Adelaide Island. To accommodate the increased numbers the Adelaide Island base will be expanded, either at its present site or at a site about 40 miles to the north-east. As it will not be possible to maintain the dogs duing the winter, they will gradually be superseded by a new fleet of vehicles.

Until the opening of Fossil Bluff in George VI Sound, Stonington Island was the southernmost British base. It has been an important centre for field work, and from it parties have travelled extensively around Marguerite Bay, on the Graham Land plateau and south to Palmer Land, George VI Sound, and Alexander Island.

SLEDGE TRIP

While he was base commander at Stonington Island in 1948-50, Sir Vivian Fuchs, and the geologist, Dr Raymond Adie, sledged down George VI Sound to the Ekland Islands and back. Their journey of 1084 miles took them 89 days.

Since 1961 much of the work south of Marguerite Bay has been centred on Fossil Bluff. This has been made possible by the regular use of aircraft based on Adelaide Island in the summer. They have also been used to transport parties and supplies direct to remote southern areas, by-passing Stonington Island.

Stonington Island, a low, rocky island in Marguerite Bay, already has a place in Antarctic history. It was there that the first women to winter in the Antarctic, Mrs Edith Ronne and Mrs Jennie Darlington, lived in 1947-48 as members of Commander Finn Ronne's private expedition.

In 1940-41 the United States Antarctic Service expedition led by Rear-Admiral Richard Byrd established its East Base on the island, which was named for the Connecticut seaport from which Nathaniel Palmer and other sealers sailed on their voyages to islands off the Antarctic Peninsula. Finn Ronne reoccupied the old East Base early in 1947.

BRITISH BASE

Only 200 yards from the American base was the British base established by the Falkland Islands Dependencies Survey, now the B.A.S., which replaced the secret wartime Operation Tabarin. Surgeon-Commander E. W. Bingham, R.N., and 10 men erected the Base E hut in 1946. They were relieved in 1947 by a party commanded by Major K. S. P. Butler, leader of F.I.D.S.

This party co-operated with Ronne's expedition, and British and American aircraft, worked together during 1947. The Americans were relieved in the summer of 1948 by the icebreakers Burton Island and Edisto, units of the United States Navy task force engaged in Operation Windmill.

Work has gone on as usual at all bases, broken only by the traditional merry-making on Mid-winter's Day.

Field work has continued from Fossil Bluff in George VI Sound, and glaciologists have inspected their marker stakes periodically although their Spartan Glacier refuge hut was closed for mid-winter.

Several parties from Stonington Island have undertaken projects in the Marguerite Bay area, but these, and other parties further north at the Argentine Islands, have been hampered as strong winds in July dispersed the sea ice. Stonington Island itself is exceptionally bare of snow and ice. more so than at any time since the base was first opened in 1946, and good use has been made of the opportunity to carry out a detailed local geological survey.

Geophysicists on Adelaide Island have carried out a gravity survey in the area north-east of the base.

LACK OF ICE

Signy Island in the South Orkney Islands, has also suffered from lack of sea ice, and the work of the marine biologists has been limited. On South Georgia, the two-year reindeer study is now well under way, and. incidentally. has kept the base supplied with excellent fresh meat.

The Fuchs Medal, instituted in 1973 in honour of Sir Vivian Fuchs, has been awarded this year to the senior pilot, Mr David Rowley, who has just retired after five Antarctic seasons with the survey. It was presented to him at the annual briefing conference at Cambridge this month.

The citation reads as follows:

"The Fuchs Medal is awarded to David Noel Rowley for outstanding services to the field programmes of the British Antarctic Survey. For five years he has set an exceptional standard of safe and dedicated flying, under conditions where normal aids to navigation have been absent and weather forecasts of doubtful value.

"Throughout he has ensured assistance and support to distant field parties, often landing on unknown surfaces; he has carried out long-distance flights and very low-level radio echo sounding with the same fortitude, care and safety.

"His dedicated performance has made an unusual contribution to the Survey's programmes in topographical survey, geology, glaciology and geomagnetism, setting a fine example for the future."

Mr Rowley is now with an airline operating between south-west England and the Channel Islands.

The Survey's former director, Sir Vivian Fuchs, was recently elected to fellowship of the Royal Society in recognition of his service to Antarctic science.

A former B.A.S. geophysicist, Dr. Drummond Matthews, now reader in marine geology in the department of geodesy and geophysics at Cambridge, has also been made a Fellow for his work on sea-floor spreading.

TRINITY HOUSE

Captain Thomas Woodfield, who has served in B.A.S. ships for 19 years and has been master of the Royal Research Ship Bransfield since it was launched in 1970, was recently appointed an Elder Brother of Trinity House, the body responsible for navigational aids and pilotage around the coasts of England and Wales.

Captain Woodfield joins Captain Frederick White, former master of the Fitzroy, the ship which, for many years, was the sole link between the Falkland Islands and South America. The Fitzroy was chartered between 1944 and 1948 to assist in the establishment and relief of the British Antarctic bases.

The new master of the Bransfield is Captain Stuart Lawrence, who has been first officer for four years.

The chief geologist, Dr. Raymond Adie, has been appointed deputy director of the Survey. Dr. Charles Swithinbank, the chief glaciologist, succeeds him as head of the B.A.S. Earth Sciences Division.

The contract for the new B.A.S. building in Cambridge has now been signed and work will begin on the site this month.

SOVIET NEWS

Traces of Iron Ore Found in MacRobertson Land

Soviet scientists have discovered signs of useful minerals, including iron ore, and also sulphur, during geological research in MacRobertson Land over an area of more than 100,000 square kilometres. Reference to their discoveries is made in the following article on scientific cooperation among nations in Antarctica by Dr Yevgeny Korotkevich, assistant director of the Arctic and Antarctic Research Institute in Leningrad.

Dr Korotkevich has taken part in or supervised several Soviet scientific expeditions to the Antarctic. He is the author of "Polar Deserts."

The cooperation of scientists from various countries in Antarctica is, to my mind, the model of an ideal cooperation, in general. There, the collective nature of present-day scientific research is not only recognised, but is even implemented.

The countries which carry out scientific research in Antarctica are participants in the international Antarctic Treaty and are members of the international Special Committee on Antarctic Research.

We know that this country, Antarctica's neighbour, conducts on the continent active research, supervised by such prominent scientists as Dr William Budd, Dr Uwe Radock, and others. I had the privilege of meeting them at various times in the Antarctic, Australia, and Leningrad.

I consider that the Australians can boast of a strong school of glaciologists and cartographers. They have equipped their permanent stations in Antarctica excellently and are successfully employing and developing the latest research methods, such as mathematical modelling.

We know also that Antarctica is being investigated quite systematically and with good results by New Zealand scientists, though the work is on a smaller scale than that of other Antarctic Treaty nations such as the Soviet Union, the United States, Britain, France, and Australia.

In our time no successful work of scientists in any field is possible without reciprocal exchange of information. This is why Antarctic explorers from various countries have long been steadily exchanging both regular bulletins and fundamental research papers.

Soviet scientists, drawing on the literature which the Arctic and Antarctic Research Institute receives from New Zealand, for instance, are watching the interesting research conducted by New Zealand scientists in the dry valleys. This is the name given to one of those rare areas that is free of an ice shield.

Soviet scientists have not been there yet. To analyse adequately the data obtained in one spot, it is, of course, essential to have more information on the general situation on the continent.

In their turn, Soviet scientists supply their foreign colleagues with the available information. In 1972, for instance, I brought to Australia a report on the work of the 17th Soviet Antarctic Expedition. It explored comprehensively a most interesting mountain glacier area in MacRobertson Land.

The Prince Charles Mountains, and the Lambert Glacier and the Amery Ice Shelf were the subject of attention

by Soviet explorers. Geological research was conducted here over a territory of 100,000 square kilometres.

Scientists drafted a geological map of the area, described the structure of outcropping rocks in 180 spots, took more than 20,000 samples for sections, and discovered signs of useful minerals, for instance, iron ore.

Incidentally, Antarctica is a continent with rich entrails. The Australians have found here hard coal deposits, and a recent Soviet expedition found signs of sulphur.

Soviet explorers performed deep drilling at Vostok Station. They took a core sample from a depth of a kilometre. Study of Antarctic ice and rock at such a depth will aid materially in understanding the development of the continent.

The 17th expedition described vegetation and collected previously unknown specimens of mosses, algae and lichens. Among the expeditions difficult and interesting tasks was the exploration of areas of West Antarctica which had not been studied before, being inaccessible because of a belt of heavy sea ice. Here the expedition choes the site for a new research station.

ANTARCTIC MEDAL AWARDS

British scientists and others who have served with United States scientific expeditions in the Antarctic have been awarded the Antarctic Service Medal. Among the recipients of the American medal is an English-born New Zealander, Mr J. C. L. M. Mather, who spent two seasons in the Antarctic investigating insects for the Bernice P. Bishop Museum, Honolulu.

Several New Zealanders were associated with this project, which began in 1960-61 and continued until the 1964-65 season. Mr Mather was a 19-year-old student teacher when he first went south aboard the U.S.S. Arneb to gather insects between New Zealand and the Antarctic for the project, which was concerned with the dispersal and distribution of insects in the Pacific.

Mr Mather, a member of the Canterbury branch of the New Zealand Antarctic Society for nearly 12 years, who is now teaching in Switzerland, made two round trips in the Arneb in the 1962-63 season. He continued the same work in the 1963-64 season.

The United States Congress approved the award of a medal for Antarctic service in 1960. Struck only in bronze, the medal can be awarded to men—and women—who serve or have served as members of United States expeditions since the beginning of 1946. The medal can be awarded to both servicemen and civilians.

On the obverse of the medal are the words "Antarctic Service" and a figure in polar clothing. The reverse displays the words "Courage, Sacrifice, Devotion," on an outline polar projection of the Antarctic Continent, all encircled by a border of penguins and marine life.

Clasps in bronze (one winter), gold (two winters), silver (three or more) distinguish individuals who have wintered in Antarctica. Military recipients who have wintered many wear on the ribbon bar a small disc bearing a raised outline of Antarctica. They may wear a ribbon bar to represent the medal; civilians can wear a miniature of the medal's obverse in their lapels.

The ribbon of the Antarctic Service Medal is elaborate in its symbolism. Outer bands of black and dark blue represent five months of Antarctic darkness; the centre portion going from medium blue through light blue and pale blue to white symbolises seven months of sunlight, and also the Aurora Australis.

Belgium associated with European research plan

Belgium's association with the Antarctica, which began when Commandant Adrien de Gerlache led the Belgica expedition south in 1897-99, has not ended with the closing of the International Geophysical Year base, Roi Baudouin, in Queen Maud Land, three years ago. A report from Expeditions Antarctiques Belges in Brussels says that since then Belgium has been engaged in discussions with nine other European nations of an active European research programme in Antarctica.

To help strengthen scientific co-operation in Europe three working parties—on space biophysics, geodynamics, and polar research—were set up at the request of the Council of Europe. The chairman of the working party on polar research is Baron Gaston de Gerlache, of the Belgian Antarctic Committee, who led the expedition which established Roi Baudouin Base in 1957-59.

In recent years small European countries have found it more difficult to maintain a significant level of scientific activity, and to support a permanent and independent Antarctic programme. Since the middle of 1971 the polar research working party, consisting of representatives of Austria, Belgium, France, Holland, Italy, Norway, West Germany, the United Kingdom, Sweden, and Switzerland, has been considering a scientific programme to be carried out in Queen Maud Land by a European Antarctic expedition.

FIVE-YEAR PLAN

The estimated cost of a programme covering five years is $17,000,000. Most of the programme could be achieved during the summer seasons but one or two parties might have to winter in Queen Maud Land. Final decisions on such a programme, and its financing, will depend on agreement between the countries represented on the working party.

A study of environmental conditions has been proposed for the first part of the scientific programme. It would include recent changes in climate, pollution of the earth, and comparison of variations of natural elements in relation to atmospheric conditions.

Study of the history of the earth's climatic environment is the aim of the second part of the programme. A general survey of an area of old ice, and detailed studies of several sites, including deep drilling to bedrock, are expected to provide a record of climatic changes covering more than 100,000 years.

SOME PROBLEMS

Baron de Gerlache has said that a European glaciological expedition in Queen Maud Land is not for tomorrow, but for some time hence. Problems still to be solved are organisation, finance, and direction, the responsibilities of the participating countries, and their share of the financial burden.

New Zealand's main activity in the sub-Antarctic has been the maintenance of a meteorological station on Campbell Island. Now oil exploration groups have been drawn to areas around the Chatham Islands, Antipodes Islands, and the Bounty Islands. Expeditions have also explored the possibility of exploiting the supplies of large crabs in the waters of the Auckland Islands.

SEALERS' ANTARCTIC LINKS

Two Canadian sealers which operate off the coast of Labrador have an historic association with the Antarctic. They are the Arctic Endeavour, once H.M.N.Z.S. Endeavour, the Royal New Zealand Navy's Antarctic supply ship, and the Theron, which was chartered to take the advance party of the Commonwealth Trans-Antarctic Expedition to the Weddell Sea to establish Shackleton Base in 1955-56.

The Arctic Endeavour has a much longer Antarctic history than the Theron. Originally she was a wartime United States Navy netlayer, the Pretext. From 1947 she was the Royal Research Ship John Biscoe, and was used by the Falkland Islands Dependencies Survey, now the British Antarctic Survey. She carried men and supplies to British bases in the Antarctic Peninsula area.

Sold to the New Zealand Government, refitted, and renamed, the John Biscoe made her first voyage south in 1956. In the 1959-60 season the Endeavour was fitted with sails—a large mizzen and a foresail. These were to help stabilise her when she halted during oceanographic survey work.

The Endeavour made her last voyage south in the 1960-61 season. Then she was sold to a Canadian sealing company.

News of the Arctic Endeavour in the role of a mail carrier appears in a recent issue of "Pole Post," a Dutch magazine for collectors of Arctic and Antarctic stamps and covers. In March last year covers were franked with a typewritten cachet: M.V. Arctic Endeavour (Ex H.M.N.Z. Ship Endeavour ex R.R.S. John Biscoe). At icefields off coast Labrador, March, 1973. (Seal fishery). M.V. Arctic Endeavour. Capt. James Gillett.

Icebreaker Atka Retired

After nearly 30 years of battling Arctic and Antarctic ice the United States Coast Guard icebreaker Southwind was taken out of service at the end of last year. She is better known as the United States Navy icebreaker Atka, which made preliminary surveys of Antarctic conditions in 1955 as a preliminary to legistic support of the United States programme for the International Geophysical Year, 1957-58.

The Atka was a Wind class icebreaker similar to the Northwind, Eastwind, Burton Island, and Edisto, all of which have been used for American operations in Antarctic waters since 1955. She was built in 1944 and commissioned as the Coast Guard icebreaker Southwind.

Early in 1945 the Southwind was transferred to the Russians under the wartime lend-lease programme.

For five years the Southwind escorted cargo ships through the Arctic Ocean north of Russia and Siberia. In 1950 she was returned to the United States and allocated to the Navy, which renamed her Atka after one of the Aleutian Islands. Then she was sent south under the command of Commander Glen Jacobsen early in 1955.

The Atka spent six weeks in Antarctic waters and sailed 7500 miles. Observers aboard the ship made five landings, four of them at places previously unknown, and found a sote for Little America V in Kainan Bay, 35 miles east of the original Little America.

In 1956-57 the Atka was one of four icebreakers in the Ross Sea group during Operation Deepfreeze II. She returned to Kainan Bay to assist in the establishment of Little America V.

WHALING COMMISSION FIXES OPTIMUM KILLING LEVEL

An automatic ban on the killing of whales whose numbers fall below a scientifically determined optimum level has been adopted by the International Whaling Commission. The plan, proposed by Australia, was adopted at the 26th annual meeting of the commission in London. It was an amendment to the renewed United States call for a 10-year moratorium on all commercial whaling for all species, which did not come to a vote.

Australia's proposal was to divide whale species into three categories, two to be fished in a controlled manner, and the third to be totally protected. Four species of baleen whale are recognised as totally protected by the 15 member nations of the commission, who account for 94 per cent of the world catch. They are the blue, grey, humpback, and right whales.

Last year the commission proposed that the fin whale should not be caught at all after 1976, but the proposal was rejected by Japan and the Soviet Union, which between them account for more than 80 per cent of all whales caught. After next year, however, the fin whale, the most endangered species, will be protected unless there are objections from Japan and the Soviet Union, which voted against the automatic restrictions. But they are expected to accept the commission's decision. This year the fin whale quota has been sharply reduced; but the quota on the minke whale, the most recent to be exploited, has been increased.

Catch limits set by the commission for the 1974-75 Antarctic season and the 1974 season elsewhere were based on information provided by the scientific committee, and are expressed in stock units. Quotas for the three major whaling regions with last year's figures in parenthesis are:

Antarctic: 1000 fin whales (1450); 4000 sei whales (4500); and 7500 minke whales (5000).

North Pacific: 300 fin whales (550); 2000 sei whales (3000); 6000 male and 4000 female sperm whales.

Southern Hemisphere: 8000 male and 5000 female sperm whales.

The commission's automatic ban on hunting certain species will operate on a selective basis.

After determining the optimum stock level for each species, the scientific committee will monitor stock and issue whaling stations with a red signal each time one or other of the whale species is threatened with decline. This will be done as soon as it is determined that the respective stock has fallen below the optimum level. Then whaling for that species will stop until the scientific committee decides that it may be resumed.

The optimum level is that at which whales can continue to reproduce themselves to maintain the stock, taking into account hunting within permissible limits.

When it fixes catch quotas the International Whaling Commission considers what rate of catching will establish the "maximum sustainable yield" from each species. An advocate of the maximum sustainable yield theory is Dr R. Gambell, chief scientific adviser on whaling to the British Ministry of Agriculture and Fisheries. He claims there is no species of whale which is now facing extinction.

According to Dr Gambell, stocks of the four totally protected baleen whales should be slowly recovering although the number of right whales is estimated at no more than 4000, and the world population of the blue whale is only about 17,000. Even the fin whale is probably increasing in numbers. Although the estimated population of 155,000 is below the level at which the maximum level could be sustained, last year's quota of 1450 should have allowed more fin whales to be born than were killed.

Sir Raymond Priestley was explorer and academic

Sir Raymond Edward Priestley, one of the few remaining survivors in Britain of those who went to the Antarctic with Scott and Shackleton, died on June 24 at the age of 87. He was an eminent scientist and university administrator, and the elder statesman of British Antarctic affairs.

As acting-director of the Falkland Islands Dependencies Survey (now the British Antarctic Survey) he was one of the chief architects of the Survey as it is today. For a number of years he was guest of honour at the B.A.S. annual briefing conference, and his lecture on his Antarctic experiences spanning 50 years was the major event of the programme.

Priestley joined Shackleton's Nimrod expedition (1907-09) as a geologist at the age of 21. Later, after writing a report on his work at Sydney University, he went south again as scientist with the Northern Party of Scott's Terra Nova expedition (1910-13). The task of the six men of the party, led by Lieutenant Victor Campbell, was to explore the coast of Victoria Land and carry out scientific work, while Scott and his Southern Party aimed for the Pole.

The Northern Party therefore spent 1911 at Cape Adare, and was then picked up by the Terra Nova and landed 200 miles to the south to continue its field work for another six weeks before being returned to Cape Evans. The men were put ashore with provisions for six weeks, two weeks' emergency rations, two tents and summer clothing.

HEAVY PACK

Unfortunately, heavy pack ice off shore prevented the Terra Nova returning before the onset of winter, and the men spent nine months there, suffering great privation, before they were able to undertake the gruelling 250-mile sledge journey back to base. Seven of those months were spent in a rock shelter on Inexpressible Island in Terra Nova Bay, and in a nearby ice cave measuring 12ft by 9ft by 5ft, which they had excavated as a shelter from the incessant gales. In the Antarctic, 1912 was the stormiest year on record and the winter set in unusually early.

Campbell's party lived on the remains of their rations supplemented by 12 seals and a few penguins. Seal blubber was used as fuel for cooking and light, but not to provide warmth as the cave had to be kept below freezing so that it did not melt.

SHARING FOOD

Priestley told the story of the Northern Party and its ordeal in his book "Antarctic Adventure", which is now being reprinted. His scientific work on the two expeditions, published in the official series of reports, included an important monograph on Archaeocyathinae, and a large volume entitled "Glaciology" (of which he was co-author with Sir Charles Wright) which is a classic work on the subject.

Their meagre supply of food had to be strictly rationed, and it is a tribute to Priestley's judgment and integrity that, with complete confidence, his companions entrusted him with the responsibility of eking out the food and dividing it equally between them.

Despite their privations Priestley and his companions recovered swiftly after their return to Cape Evans. Less than a month later, from December 12 to 16 Priestley led the ascent of Mount Evebus, this time by a new route. The volcano was mapped, and data and specimens collected, some of the latter being hurled out of the crater while the party was there.

Barley had Priestley become an undergraduate again when the First World War broke out. He served as adjutant to the Wireless Training Centre, was in France with the 46th Divisional Signals and finished active service as Chief Signals Officer with the First Army, being awarded the Military Cross. Then he was seconded to the War Office to write the "Official History of the Signal Service". From him too, came "Breaking the Hindenburg Line", the story of the 46th Division.

In 1920 Priestley returned to Clare College, Cambridge. There, with Frank Debenham (another member of the Terra Nova expedition and later professor of geography in Cambridge) he founded the Scott Polar Research Institute as a memorial to Captain Scott and his companions. The institute was the first of its kind in the world, and today is one of the foremost polar libraries and an important centre for polar studies, both national and international.

UNIVERSITY WORK

After taking his M.A. degree Priestley was appointed a Fellow of Clare College, where he remained for 11 more years. For much of the time he was secretary of the University Board of Research Studies. He was also appointed the first Secretary-General of the Faculties, a post created in 1934.

Then for three years he was Vice-Chancellor of Melbourne University. For 14 years he was Vice-Chancellor of Birmingham University where he is remembered as one of the outstanding vice-chancellors of his time. He also established close links with a number of Commonwealth universities, largely through his work as a member of the University Grants Commission.

At the request of the Birmingham University Council Priestley remained in office beyond the normal age for retirement. When he left in 1952 it was not to well-earned rest, but to new and equally challenging duties. From 1953-55 he was chairman of the Royal Commission on the Civil Service.

Then, in 1955, he was able to return to his first love—the Antarctic, when he became acting-director of the Falkland Islands Dependencies Survey, deputising for Sir Vivian Fuchs during his absence as leader of the Commonwealth Trans-Antarctic Expedition, 1955-58. This was a period of great expansion as it covered the International Geophysical Year, 1957-58, for which interest was concentrated on the Antarctic and Priestley chose "Twentieth Century Man in Antarctica" as the subject of his presidential address to the British Association for the Advancement of Science in 1956.

MODERN RESEARCH

In 1957, he was able to see modern Antarctic research in action when, at the age of 70, he accompanied the Duke of Edinburgh on part of his Commonwealth tour and visited several British bases on board the new Royal Research Ship John Biscoe. Two years later, he went south as an observer with the United States Antarctic expedition, and was able to revisit the scene of his early labour on Ross Island and in Victoria Land.

Although he retired for the third time in 1959, Priestley remained active as first chairman (1959-60) of the Royal Society's British National Committee on Antarctic Research, and from 1961-63 as president of the Royal Geographical Society. He retired finally only when old war injuries made him less mobile.

Priestley was a first-class scientist and an outstanding administrator, but those privileged to work with him remember him as much for his patience. kindness, humility and sense of humour as for his great achievements during a long and distinguished career.

He was awarded the Polar Medal and Bar, and the Royal Geographical Society's Founders Medal, and in 1949 was knighted for his services to education. His wife, Phyllis Boyd, a New Zealander whom he married in 1915, died in 1961. He is survived by two daughters.

Dr H. M. Dater, U.S. historian

A distinguished United States Antarctic historian, Dr Henry M. Dater, died in Washington late in July. He was the United States Navy's eyewitness historian for Antarctica, which he visited on a number of occasions in the last 20 years.

Harry Dater was associated with Operation Deepfreeze from its beginnings in 1955. He was responsible for recording its work each season, and he also wrote articles and booklets on United States sea and air operations in the Antarctic.

At the time of his death Harry Dater was working with National Science Foundation support at the Centre for Polar Archives, National Archives, on the early stages of a comprehensive history of recent United States experience in the Antarctic. He was to have retired this year so his project may remain unfinished.

One of Harry Dater's chief interests was the Antarctican Society, which includes in its membership polar veterans and scientists and others who have worked or are interested in Antarctica. He was one of the founders, served as president, and edited the society's occasional bulletin. The society owed much to his interest and enthusiasm.

As a result of his Antarctic visits Harry Dater made many friends in Christchurch. He was a member of the Canterbury branch of the New Zealand Antarctic Society, and through the Antarctican Society gave official and personal support to the Canterbury Museum's Antarctic centre which will be established in the new wing. Largely because of his efforts the society made gifts of $500 and exhibits for the Antarctic centre.

Lady Mawson and Mrs Byrd

Widows of two noted Antarctic explorers—Lady Mawson and Mrs Byrd—have died in the last six months. Mrs Byrd, who was 85, died this month in Boston. Lady Mawson, aged 82, died at the end of May in Adelaide.

When Sir Douglas Mawson led the 1911-1914 Australasian Antarctic Expedition south, Lady Mawson, then Paquita Delpratt, waited in Adelaide. She married Sir Douglas Mawson on his return.

In 1964 Lady Mawson published a biography of her husband called "Mawson of the Antarctic." In it she argued that the key to his career was that he was one of the first professional scientists to believe that the Antarctic was not just a venue for races to the Pole or other selected places, but a challenge to the acquisition of physical knowledge.

A vast area of Antarctica east of the Ross Ice Shelf bears the name Marie Byrd Land. Rear-Admiral Richard Byrd named the north-west part of the land which he explored from the air on his first expedition to honour his wife. In his book "Little America" he said he had done so because she had backed and helped him, and shouldered much of the burden of the expedition. Later the name was applied to the whole area.

After Rear-Admiral Byrd died in 1956 Mrs Byrd continued many of his favourite projects. She also made an inventory of the many historic items in the Byrd collection which spanned 50 years of adventure and exploration.

Policy committee to study future of historic huts

A special committee to consider future policy on the historic huts in the Ross Dependency, which are the responsibility of New Zealand under the Antarctic Treaty, has been established by the Ross Dependency Research Committee. The committee will study the Discovery hut at Hut Point, near McMurdo Station, Scott's hut at Cape Evans, Shackleton's hut at Cape Royds, and Borchegrevink's hut at Cape Adare.

The chairman of the committee is Mr R. B. Thomson, superintendent of the Antarctic Division, Department of Scientific and Industrial Research. Dr R. K. Dell, director of the Dominion Museum, and the Surveyor-General, Mr I. Stirling, are the representatives of the Ross Dependency Research Committee.

The New Zealand Antarctic Society, which has provided caretakers for the huts in the McMurdo Sound area since 1969, was invited to nominate two representatives. They are Mr R. M. Heke, a past president of the Canterbury branch, who was in charge of the construction of Scott Base in 1956, and Mr H. Burson, who was a caretaker in the 1971-72 season.

This season the New Zealand Antarctic Society's caretakers will be two men who have corresponded over the last few years because of their common interest in Antarctic stamps and the Antarctic but had never met until they attended an Antarctic orientation course last month. They are Messrs K. A. Smith, of Christchurch, and Mr G. Sylvester, of Wellington.

Messrs Smith and Sylvester will fly south early in December and spend about three weeks looking after the historic huts at Cape Evans, Cape Royds, and Hut Point. Mr Smith, who is 46, is a shed supervisor for the Lyttelton Harbour Board, and a member of the committee of the Canterbury branch of the society. Mr Sylvester, who is 30, is a fireman with the Wellington Fire Board, and has worked as a deer hunter for the New Zealand Forest Service.

Relics from Cape Evans

An inkwell used by Captain Scott in the expedition's hut at Cape Evans may be added to the collection of Antarctic relics in the Canterbury Museum. The inkwell is now at a school Scott attended when he was a small boy, but Mr Richard Pape, author of the Second World War book, "Boldness Be My Friend," hopes to be able to retrieve it.

Mr Pape, who collected the inkwell tarctic in 1958, now lives in Canberra. and other relics when he visited the An-Dr R. S. Duff, director of the museum, called on him last month, and he has now presented to the Antarctic centre several items from the hut at Cape Evans. They include an enamel mug bearing the name of Captain Oates, a bottle of Indian ink used by Dr Edward Wilson, a funnel, a reel of cotton, and a ball of string.

Some of the material added recently to the Antarctic collection concerns the relief ship Morning, which made two voyages, the second in company with the Terra Nova, during Scott's first expedition. Mrs Evelyn Forbes, daughter of the expedition's geologist, Hartley Travers Ferrar, has presented some of her father's personal relics. They include music for a song composed by Gerald Doorly, third officer of the Morning, with words by the chief engineer, J. D. Morrison, for the first relief trip.

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.

SCOTT BASE HUSKIES

Sir,—I was surprised and concerned to read in your June issue a letter signed "Leptonychotes" which clearly indicates to me that it has been written with little knowledge of the real situation, particularly in regard to the stringent measures of control on conservation matters New Zealand has imposed over many years. I am sure that the majority of your readers are well aware of the leading role New Zealand has played in the development and implementation of the Agreed Measures for Conservation of Antarctic Flora and Fauna and I do wish to clarify the situation and correct any wrong impressions resulting from "Leptonychotes' " letter.

All New Zealand proposals to undertake research programmes in Antarctica are considered very carefully, particularly for their scientific value, by the Ross Dependency Research Committee before being recommended to the Minister of Science for inclusion in the New Zealand Antarctic Research Programme. Projects of dubious scientific quality are turned down at this early assessment stage and are not, as suggested by your correspondent, part of the New Zealand Antarctic Research Programme.

Where an approved scientific project, or indispensable food for dogs requires the killing or taking of any fauna a further investigation is undertaken by myself as "the appropriate authority" and "authorising officer" as designated in the Antarctic (Fauna and Flora) Regulations, 1971, to ascertain whether I should issue a permit, and if so, the conditions and limitations to be specified in the permit. These regulations came into force on January 1, 1972, to give effect to the Measures for the Conservation of Antarctic Fauna and Flora as agreed by the Antarctic Treaty countries at the third consultative treaty meeting.

Any New Zealander who commits an offence against these regulations or fails to comply with the conditions or limitations in any permit issued to him is liable to heavy penalties.

Full information on all permits issued is required to be exchanged between treaty countries annually. They may take action where they consider permits have been issued in contradiction of the principles of the treaty, but such action has not been found necessary to date.

In regard to the killing of seals strictly for dog food it should be known that these numbers are minimal (the last few years average total = 52) in relation to the estimated seal population of 48,000-52,000 in the Western Ross Sea. It has not been proven (as your correspondent claims) "that the killing of even a few seals can upset future populations and breeding areas" but rather it has recently been claimed by some researchers that the selected killing, usually of old males as we do, does in fact "aid reproduction of the species".

The New Zealand Antarctic Research Programme includes a continuing annual programme of "research, population and behavioural studies of the Weddell seal in the McMurdo Sound area" and one of the objects is to ensure as far as possible that our limited issue of permits not only complies with but remains well within the requirements of the Agreed Measures particularly Paragraph 4: (a) no more native mammals or birds are killed or

taken in any year than can normally be replaced by natural reproduction in the following breeding season; and (b) the variety of species and the balance of the natural ecological systems existing within the treaty area are maintained.

I have no evidence that even suggests New Zealanders have infringed these measures.

Yours, etc.,
R. B. THOMSON,
Superintendent, Antarctic Division,
D.S.I.R.

ANTARCTIC BOOKSHELF

THE BIOLOGY OF THE VESTFOLD HILLS, ANTARCTICA

by

G. W. Johnstone, D. J. Lugg, and D. A. Brown

ANARE Scientific Reports. Series B (1) Zoology. Publication No. 123. Issued by Antarctic Division, Department of Science, Melbourne, Australia, 1973.

This report reviews the biology of the Vestfold Hill, Princess Elizabeth Land, from information obtained up to 1973 by Australian National Antarctic Research Expeditions (ANARE) and other expeditions. The Australian station Davis was established there in 1957.

One of several ice-free "oases" round the coast of Antarctica, the Vestfold Hills area has two unusual features: the extensive area of snow—and ice-free land, and the numerous saline and freshwater lakes. The review of biological data collected by ANARE members stationed at Davis, and by other visitors to the area, is intended to provide the groundwork for a continuing biological study of the region begun by the Antarctic Division in 1973.

Although a reasonable body of information about the Vestfold Hills has accummulated over the years, no continuing study of the biology of the area has previously been undertaken. A great deal, therefore, remains to be investigated. Some of the significant findings produced already by field studies during 1973 are included in the report.

G. W. Johnstone, biologist, conducted a biological survey in the Vestfold Hills in the summer of 1971-72. Dr D. J. Lugg was medical officer at Davis for the year 1963-64, and D. A. Brown was radio supervisor at the station in 1961-62.

An ice-free enclave of rock and water, the Vestfold Hills occupy about 400 square kilometres at the eastern side of Prydz Bay. There are smaller ice-free areas along the coast of Prydz Bay, but the only oasis of similar size is at the Bunger Hills. The area is bare, low-lying, hilly country, deeply indented by sea inlets, and studded with lakes and tarns of varying salinity. Numerous small islands fringe the coast up to five kilometres offshore.

In 1935 the Vestfold Hills were first sighted by Captain Klarius Mikkelsen, servicing whaling factory ships off the Mac-Robertson Coast. He named the area after Vestfold, a county in Noreay to which it bears some resemblance. The Norwegian explorer Lars Christensen visited the area in 1937 and carried out aerial photography which was the basis of the first map of the Vestfold Hills.

Lincoln Ellsworth and Sir Hubert Wilkins made a brief visit in 1939, and in 1947 aerial photographic surveys were carried out by the United States Navy's Operation Highjump. Members of the Soviet Antarctic Expedition made a brief landing in December, 1956.

The first Australian National Antarctic Research Expedition to the area was in early March, 1954, when an exploring party led by P. G. Law landed at the Vestfold Hills. The party revisited the area in late January, 1955, and Davis was established in January, 1957. Apart from a temporary closure during 1965-68, the station has been in continuous operation since then with an annual complement of up to 14 men.

In their report the authors describe the biology of the area in detail, listing all species so far recorded. They say in their abstract that few invertebrate species have been found, reflecting the comparative youth of this ecosystem and the difficulty of colonising such a remote area.

Extensive fossil-beds occur on relict marine beaches surrounding the saline lakes. Six species of birds breed there, and the area includes the most southerly known colony of giant petrels. Amongst the four species of seals which occur, especially interesting is the large non-breeding herd of southern elephant seals which occupies the beaches during summer.

Emperor penguins are regular visitors to the Vestfold Hills area. Their nearest known breeding place is on the fast ice of Amanda Bay at the foot of ice-cliffs, some 85 kilometres south-west of Davis. The colony was viewed from the air twice in 1957. On the first occasion the population was estimated at 3000 to 5000 birds, and the second time the estimate was 1000 to 2000. When a landing was made in 1960 3500 to 4000 birds were recorded in two groups.

The Adelie penguin is probably the most abundant species of bird in the Vestfold Hills. It breeds on at least 17 of the outer islands, and at several locations on Long Peninsula. Population estimates made at different times during the summer vary from year to year, but the breeding population appears to be in the order of 130,000 pairs.

Weddell seals breed in the Vestfold Hills area, and 150 to 200 pups are born annually. The Weddell is the only species of Antarctic seal which breeds close inshore on fast sea-ice and not in the pack ice. In the Davis area they are least commonly seen in winter when they are presumably concentrated around the outer edge of the sea-ice. They start to reappear close inshore in late September and early October, and pupping occurs from mid-October until late November. Counts of Weddell seals in Long Fjord in November ranged from about 150 adults and 149 pups in 1972 to 105 adults and 84 pups in 1960.

Crabeater seals appear near Davis occasionally on the beaches and inshore ice exclusively in summer, their true home being in the pack ice. The carcases of at least two were found about 15 metres from the water's edge at the south-eastern corner of Deep Lake. Most seal carcases found inland at other Antarctic oases have been identified as crabeaters, and probably many of those in the Vestfold Hills will prove to be of this species.

Leopard seals have never been recorded near Davis in winter. They occur occasionally on the sea-ice, and mainly in summer. Leopard seals are notorious as predators of Adelie penguins, and at Davis they have been recorded chasing and catching Adelies on at least three occasions.

No other Antarctic locality is known to attract elephant seals in such large numbers as the Vestfold Hills. The southern elephant seal is a predominantly sub-Antarctic species, breeding at most sub-Antarctic islands as far south as King George Island (62deg S) in the breeding season these seals disperse at South Shetland Islands. Outside the sea.

Non-breeding groups occur at Ile St Paul and Ile Amsterdam in the Indian Ocean and Tristan da Cunha to the north of their breeding range, and at the Vestfold Hills. The discovery there of a regular hauling-out ground where several hundred elephant seals come ashore to moult and rest was recorded in 1957. Individuals have been recorded at other localities, and a non-breeding group of up to 32 seals has been reported at Peterson Island about 30 kilometres from Casey.

Davis Beach, the only beach actually in the station area has been particularly favoured by elephant seals in some years, especially in 1970. Maximum annual counts between 1957 and 1972 in the region from two kilometres north of Davis south to the Sorsdal Glacier have ranged from 380 on Davis Beach in 1971 to 703 on all the mainland beaches in 1969.

International interest in Antarctic Centre

International support for the Antarctic centre in the Canterbury Museum's new wing has been obtained as a result of visits to 10 of the Antarctic Treaty nations by the museum's director, Dr R. S. Duff. Mr Lars Eric Lindblad, whose travel organisation has been running tourist cruises to the Antarctic for several years, has agreed to contribute $10,000 a year for the next three years to the centre, and the United States National Science Foundation will add another $15,000 to last year's grant of $50,000. Antarctic material of scientific and historic interest will be provided by other countries.

After his visits to Australia, Argentina, Belgium, Chile, France, Japan, Norway, the Soviet Union, Britain, and the United States, Dr Duff says the Antarctic centre will have eventually the most complete scientific Antarctic library assembled under one roof.

Dr Duff considers that the most exciting material he obtained during the four months he was overseas was a replica collection of equipment used by Amundsen—sledges, fur clothing, tents, and dog harness. These were obtained in Oslo, in return for a small token payment, from the B.B.C., which has had a team in Norway making a feature film about Amundsen's South Pole expedition.

Other material includes the only original item given for the centre. It is a caribou skin parka made by Canadian Eskimos for Sir Hubert Wilkins, who made the first Antarctic flight in 1928, and later was associated with Lincoln Ellsworth in his attempts to fly across the continent.

The parka was given by Sir Hubert Wilkins to Dr Paul Dalrymple at McMurdo Sound in November, 1957. Dr Dalrymple. who served at the Amundsen-Scott South Pole Station in 1957-58, gave the parka to Dr Duff in Washington earlier this year.

Dr Duff also has a set of 20 photographs of the Belgica, the ship commanded by Adrien de Gerlache, leader of the Belgian expedition of 1897-99. The Belgica was locked in the pack ice of the Bellingshausen Sea for 12 months and became the first exploring vessel to winter in the Antarctic. First mate of the Belgica was Roald Amundsen.

De Gerlache took the photographs, and they have been presented to the museum by his grandson, Bernard de Gerlache, who, as an ensign in the Belgian Navy doing his national service, was an observe for the Belgian-Netherlands Antarctic Expeditions Committee at McMurdo Station in the 1972-73 season.

A selection of water colours painted by Dr Edward Wilson on Scott's last expedition will probably be transferred on permanent loan to the Antarctic centre by the Scott Polar Research Institute. Also the centre will have on display busts of Antarctic explorers. Dr Duff located busts of Shackleton, Fuchs, Amundsen, and Byrd, and is negotiating with the countries of origin for copies to be made and given to the centre.

The Dulverton Trust, London, has made a special grant to cover the cost of casting a bronze replica of the bust of Shackleton in the Edinburgh headquarters of the Royal Scottish Geographical Society. In addition to the busts of Scott, Shackleton, Fuchs, Amundsen, and Byrd, there will be busts of Charcot for France and Hillary for New Zealand.

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

The New Zealand Antarctic Society (Inc.)

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

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

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

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

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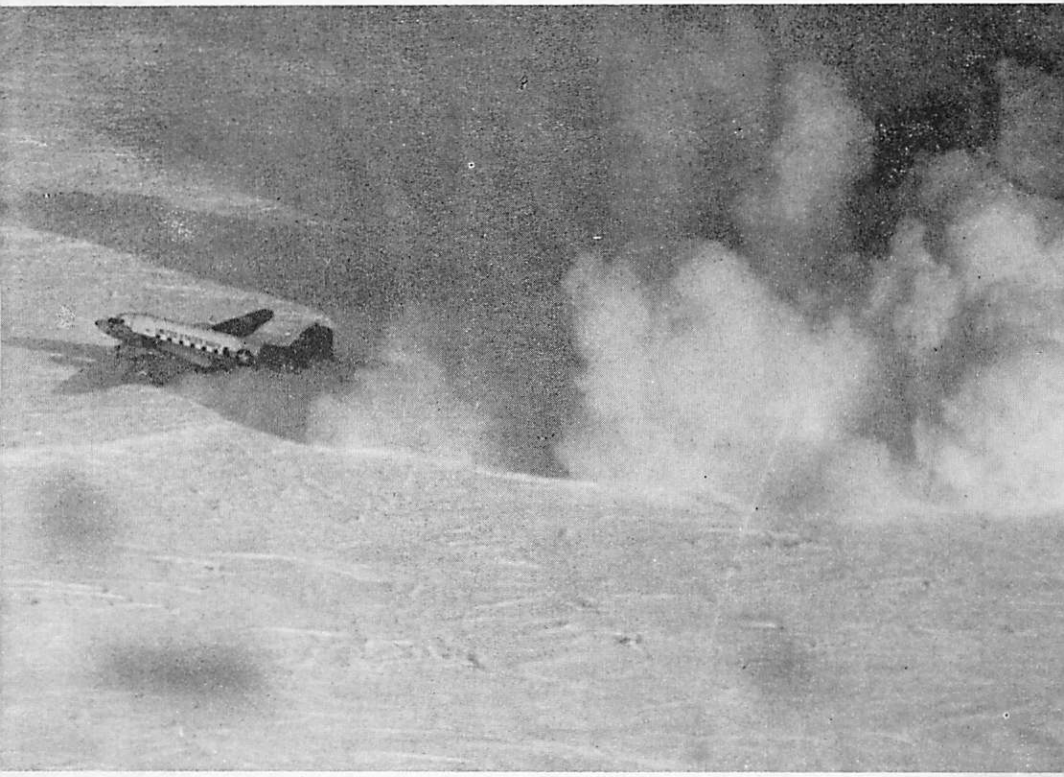

QUE SERA SERA, THE FIRST AIRCRAFT TO LAND AT THE SOUTH POLE, TAKES OFF ON THE RETURN FLIGHT TO McMURDO SOUND. THE TIME IS AFTER 9.30 P.M., THE DATE IS OCTOBER 31, 1956.

U.S. Navy Photo

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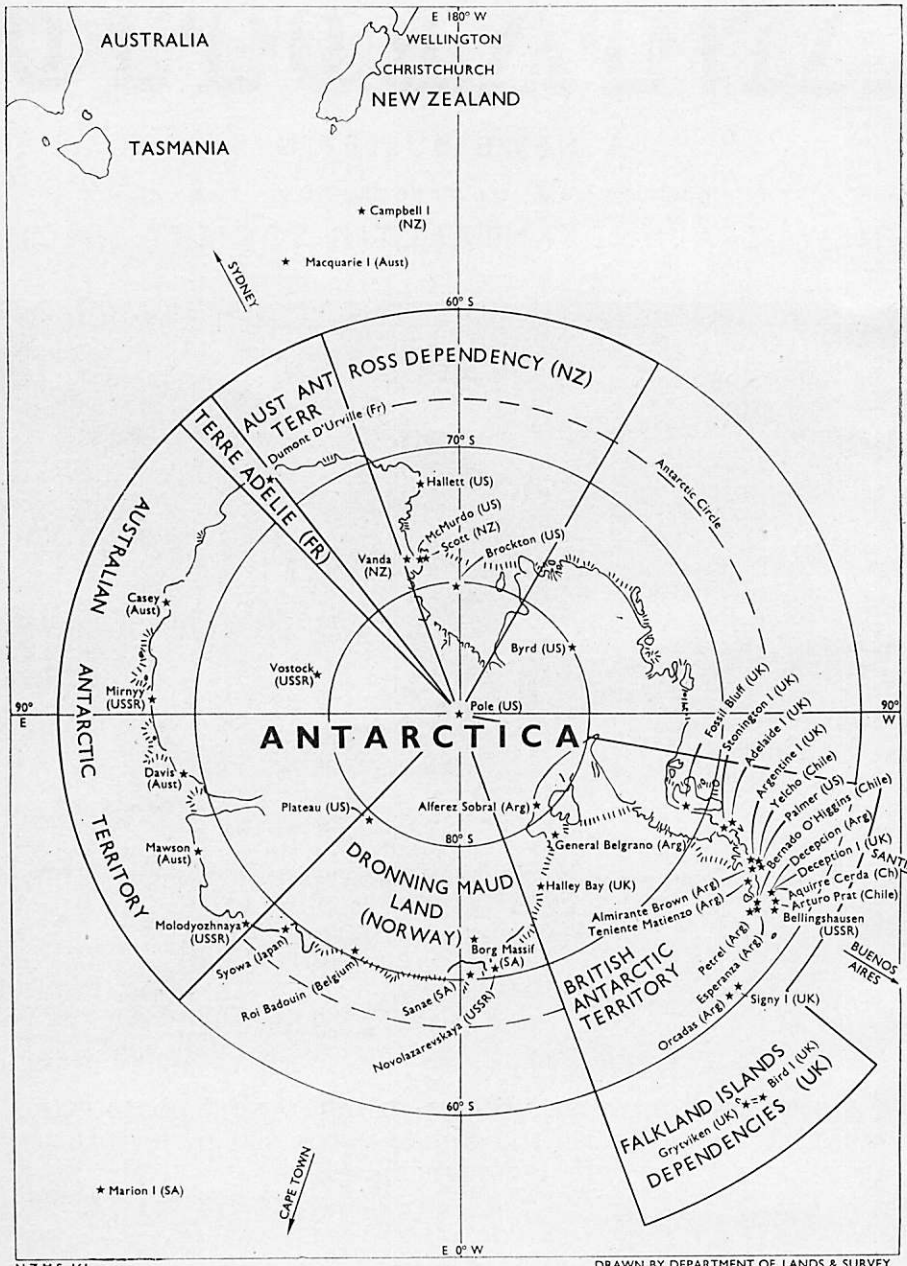

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Secretary, New Zealand Antarctic Society (Inc.), P.O. Box 1223, Christchurch, N.Z.

CONTENTS

This is an Antarctic season of remembrance. The dedication of a new scientific station at the South Pole next month will mark 20 years of research in Antarctica by the United States.

Before scientists could live and work at the Pole other men had to risk the unknown as Scott and Amundsen had done.

On October 31, 1956, seven Americans landed at the Pole and stood where no man had been for 44 years. They were there only 49 minutes, but time is no measure of how much they contributed to Antarctic research.

Deepest hole drilled on Commonwealth Glacier

Early this month a New Zealand drilling team working on the Commonwealth Glacier 60 miles west of Scott Base, in the Taylor Valley, drilled to a depth of 1076ft. This was the deepest hole ever drilled on the Antarctic Continent. But soon after the drillers reached this depth the drilling rig collapsed when a welded frame member broke, and was extensively damaged.

Most of the damaged equipment was repaired in the engineering workships at McMurdo Station, and spare parts for the rig were flown from the United States. Drilling was resumed later in the month near an unnamed lake east of Lake Chad. The site is west of Canada Glacier in the Taylor Valley.

Six men were working on the rig when it collapsed. They were removing core barrel in readiness for the move to the new site. Eight hundred and 50ft of barrel were left in the hole when the break occurred.

A helicopter attempted to lift the mast into an upright position so that wreckage at the base could be cleared. But the helicopter had to drop its load at the critical stage to avoid crashing, and more damage was done to the rig.

Earlier in the season winter storms and high tides in the McMurdo Sound area caused the abandonment of one of the major projects of the New Zealand programme — drilling through the sea ice into the bed of the sound.

Eighty per cent of the fast sea ice in McMurdo Sound was broken up by a combination of high winds and high tides in the middle of August. This was the first time there had been such a major breakup for at least 60 years. As a result the plan to drill holes in the central part of the sound was abandoned. Drilling at New Harbour was deliayed until the end of October because it was too difficult and dangerous to transport the drill crew, fuel, and other supplies over the remaining broken ice track across the sound.

In the first two weeks of September an American team led by Dr S. B. Treves, one of the United States scientists associated with the Dry Valley Drilling project, and a New Zealand team led by last season's Scott Base leader, Mr H. W. Jones, made a traverse from McMurdo Station to New Harbour and back.

Dr Treves reported on his return that the drilling shack had not wintered well. the east wall of the building was the only part left standing, and the roof had disappeared. All the lightweight items in the shack had been blown away, and the remaining equipment and stores were in a shambles with large amounts of sand everywhere.

Early in October a party from Scott Base, which included the drilling superintendent, Mr J. Hoffman, and members of his team, visited New Harbour to check the drill rig and its motor and restore the wrecked drilling shack. Drilling began on October 30 at a site one kilometre inland from last season's site.

Drilling was stopped after the first 30ft to check the squipment. It was found to be functioning well, and by November 4 the drill had reached a depth of 205ft. Progress through the overlying sedimentary strata towards the basement rock was checked on November 17. The drill was at 608ft when salt water penetrated the hole and froze the casing.

International scientific study of Mount Erebus

New Zealand, French and United States scientists began last month the world's first major scientific assault on Mount Erebus, one of Antarctica's two known active volcanoes. They will make a hazardous descent into the volcano's inner crater to collect samples of gas and lava, suspended above a lava lake by a winch, facing high temperatures, choking gases, and minor eruptions and protected by special heat-resistant clothing, helmets, and gas masks.

One of the world's eminent vulcanologists, Dr H. Tazieff, who is leading the French party, has described the expedition as the greatest challenge he has ever faced. Mr R. B. Thomson, superintendent of the Antarctic Division, Department of Scientific and Industrial Research, says the project is possibly the most exciting Antarctic event in which New Zealand has been involved since Sir Edmund Hillary's dash to the South Pole.

Early in November the field leader of the Erebus project, Mr Shaun M. Norman, and Dr S. B. Treves, the American geologist in the joint New Zealand-French-American expedition of 14 men, made a preliminary reconnaissance flight round Erebus and chose a helicopter landing site, and the base camp site, which is on an old lava flow about 500yds from the main crater rim of the 12,450ft mountain.

With the two men were a survey assistant, Mr J. Rotheray, and a field assistant, Mr R. Rainsbury. The party walked to an old crater and built a survey cairn in view of Scott Base. A tellurometer was set up for accurate measuring of distances by radio waves. The men later walked round the crater rim and saw a minor eruption of lava from the lava lake in the inner crater.

Several days later the party, and a surveyor, Mr J. Williams, and the main expedition's official United States Navy Photographer, Mr Richard Beaudet, were flown in two helicopters to Mount Erebus again. Working from the camp near the summit the surveyors made a survey of the area, and mapped the rim of the main crater.

Before the survey was completed the party suffered from lack of oxygen at the high altitude camp. An urgent request for oxygen was sent to Scott base on November 18. A United States Navy helicopter left McMurdo Station with an oxygen cylinder, but took several hours to reach the camp because of low cloud and almost zero visibility.

The worst-affected member of the party was the field assistant, Mr Rainsbury. He was flown back to Scott Base, and has now recovered. But his place in the expedition has been taken by another field assistant from Scott Base, Mr J. Swindella.

FRENCH PARTY

Because of the dangers of altitude sickness the main expedition spent several days acclimatising before beginning the crater assault. Dr Tazieff and the five other Frenchmen stayed in the Mount Cook area at an altitude of about 7,000ft to accustom themselves to the rarefied atmosphere before they flew south from Christchurch early last month.

The first phase of the Erebus project ended on November 28, when the reconnaissance party returned to Scott Base. Plans for the expedition provide for occupation of the summit camp about December 10, and the descent into the inner crater about 10 days later.

GEOLOGICAL EXPEDITION TO BOWERS MOUNTAINS

A geological expedition to the Bowers Mountains in Northern Victoria Land, one of the major events in this season's New Zealand Antarctic Research Programme, began early last month. Two field parties were flown into the area on November 10 by a United States Navy VXE6 Squadron Hercules. Using five sledges and three motor toboggans, the parties will remain in the area for two months, and cover 500 to 600 miles each in a detailed study of the geology of the Bowers Mountains, which lie between the Rennick Glacier and the north-west coast of the Ross Sea.

One party led by Dr M. G. Laird, of the New Zealand Geological Survey, Christchurch, is concerned with stratigraphy—the differentiation and relationship between various rock strata and their ages. The other party, led by Dr R. A. Cooper, of the Geological Survey, Lower Hutt, specialises in palaeontology —the identification and dating of rocks according to the fossilised marine animals and plants trapped within them.

New Zealand's expedition is part of an International Geological Correllation Project sponsored by U.N.E.S.C.O. to examine the relationships between Australia, New Zealand, and Antarctica. In Dr Laird's party are Dr A. Wodzicki, Geological Survey, Lower Hutt, Dr J. Bradshaw, University of Canterbury, and Mr I. Curphey, field assistant, of Greymouth.

Dr Cooper's party includes Mr J. Simes, Geological Survey, Lower Hutt, Dr J. Jago, department of applied geology, South Australia Institute of Technology, Adelaide, and Mr P. Braddock, field assistant, of Picton. Dr Jago joined the expedition because of his specialised knowledge of Tasmanian fossil rocks, which are closely related to those found in the Bowers Mountains.

The geological research programme forms part of a larger study of the oldest rocks of South-east Australia, New Zealand and Antarctica. Fossils found by Dr Laird in the Evans Neve area in 1971 showed close relationships with those in rocks of similar ages in Australia, New Zealand, Eastern Siberia, and China. These finds indicated that about 50 to 120 million years ago these now widely-separated areas were much closer together and shared a common sea life.

FOSSIL EVIDENCE

Dr Cooper's party will attempt to find further fossil evidence to confirm these relationships. The geologist will also examine the various rock strata, using fossil evidence to map the chronological sequence of events which formed these rocks and to show how they relate to events elsewhere in Antarctica and the world as a whole.

Dr Laird's party will seek to extend the evidence from the limited area examined to date by travelling further north and examining the stratigraphy of similar aged rocks in other mountain areas. The rocks of the Bowers Mountains belong to the Cambrian period of geological history, which extended from about 600 million to 500 million years ago, and they reach an estimated thickness of 20 kilometres.

Because the Bowers group is so thick, and its upper part belongs to the late Cambrian period, there is a strong possibility that a complete sequence of Cambrian rocks may be found here. It may extend back to the truly ancient Pre-Cambrian area at the dawn of life on earth.

Recent reconstruction by geological experts of the ancient super-continent of Gondwanaland also place the western half of New Zealand's South Island near Northern Victoria Land. Detailed studies of the Bowers Mountains can help to construct a picture of the geography of the South-west Pacific as it was millions of years ago.

Dr Laird's party landed on the Leap Year Neve at the head of the Leap Year Glacier almost in the middle of the 120-mile long study area. Dr Cooper's party was put down about 60 miles further south on the northern edge of the Evans Neve.

In the Leap Year Neve area Dr Laird's party will spend up to a week studying the surrounding rock outcrops before moving north to the head of the Carryer Glacier, a distance of about 30 miles. It will return to its starting point this month and spend a week exploring to the south of the Molar Massif, a range of mountains forming the western flank of the Leap Year Glacier.

SECOND STAGE

At the beginning of the second week of this month the party will return to its starting point again to meet Dr Cooper's party which will have travelled up from the south. The two parties will spend two to three days together, comparing notes and revising plans for the second stage of the expedition. A re-supply flight will bring in extra fuel for the toboggans, mail and Christmas food, and take out rock samples.

Then Dr Laird's party will cross the Molar Massif, if they can find a negotiable pass, and travel slowly down the steep and narrow Sledgers Glacier, examining rock faces as they go. This part of the journey, about 30 miles, will probably take about 10 days because of the many rock outcrops to be examined, and because of the dangerous nature of the glacier terrain.

The Sledgers Glacier joins the Rennick Glacier at one of its narrowest parts (about 12 miles wide) and the party will turn to the north and travel down the edge of the Rennick Glacier to Mount Soza (7150ft), once again taking about 10 days to complete this leg of the journey and explore the Mount Soza region.

One week has been allotted to make the 4600ft climb up the Sledgers Glacier to the party's starting point. There the party will be picked up by a Hercules aircraft and flown back to Scott Base. If the party is unable to reach the starting point by January 10 it will cross the Rennick Glacier to an alternative landing site used by an American field party operating further to the west.

Dr Cooper's party will make a two-day journey to the Webb Neve 35 miles to the south-east of the original landing point. Here the party will spend 10 days examining Dr Laird's original fossil locality. This is the only known locality within 1000 miles for Trilobites, which are among the earliest known fossil life, and have been extinct for 270 million years.

R-SUPPLY FLIGHT

When the party returns to the landing point it will examine small rock exposures nearby for a few days before moving to the Houliston Glacier, 35 miles to the north. Here it will make a circuit round the Leitch Massif and the West Quartzite Range. Then it will travel north to meet Dr Laird's party for the re-supply flight. This flight will bring in a new member of the team, Dr D. I. MacKinnon, of the University of Canterbury, who will replace Mr Simes.

After the re-supply both parties will travel together to a point about half-way down the Sledgers Glacier where it turns sharply and pours over a huge ice-fall. Once Dr Laird's party as negotiated this difficult and dangerous obstacle, Dr Cooper's party will return up the glacier and go north to Helix Pass. On the way it will examine any fossil localities noted by Dr Laird during his earlier traverse. Failing that, it will try to examine places missed by Dr Laird before returning to the pick-up point on the Leap Year Glacier by January 10.

Exploration of Lakes in Darwin Mountains

Previously unexplored lakes in the Darwin Mountains of the Britannia Range, and the Brown Hills area, are being studied this season by scientists from the University of Waikato. Their main object is to investigate the chemistry, physics, and sediments of Lake Wellman in the Darwin Mountains. They will also study the geochemistry, geomorphology, and limnology of Trough Lake and Lake Wilson in the Brown Hills.

These three lakes are closed drainage basin lakes, and all are south of Lake Miers, the most southerly lake at present known to have perennial water. It is possible that Lake Wilson will contain perennial water because it is only 100 metres above sea level. Study of the present composition of the lakes and their sediments will provide knowledge of past climatic, glacial, and marine changes, and the geochemical processes now taking place in the basins.

Leader of the Waikato team is Dr C. H. Hendy. Other members of the party are Professor A. T. Wilson, Dr T. Healy, and Messrs A. Bonny, M. Grimsted, and P. King. The scientists were flown from Scott Base to Touchdown Glacier by a United States Navy VXE6 Squadron Hercules this month, and later by helicopter to Lake Wilson.

Later this month the party will be flown by Hercules from Touchdown Glacier to Midnight Plateau. From there it will walk to Lake Wellman. Early next month two helicopters will pick up the party and its equipment, fly to Lake Wilson, refuel at Touchdown Glacier, and then proceed to Scott Base.

Next month the University of Waikato scientists will also continue their intensive study of the bathymetry and sediment distributions of the McMurdo Oasis lakes by sounding and coring Lake Fryxell in the Taylor Valley. Later the team will continue its study of Lake Bonney. Two members of the party will travel by helicopter from Lake Fryxell; the others will walk.

Late in January the scientists will return to Trough Lake, and also work at Lake Miers. Two members of the party will go to Trough Lake, and the other four to Lake Miers. The six men will be picked up by helicopter towards the end of the month and flown from Trough Lake to Scott Base.

While in the dry valleys the party will attempt to determine the reason for the two distinct ice thicknesses on Lake Joyce. This lake was discovered by the Waikato expedition in the 1972-73 season.

Glacial history changes

Evidence which modifies theories on the glacial history in the Table Mountain area 115 kilometres west of Scott Base has been found by geologists of the Victoria University of Wellington expedition. About 6000ft up on the slopes of Table Mountain Dr P. J. Barrett, director of the university's Antarctic Research Centre, and Messrs H. Keys, R. W. Plume, and R. D. Powell, found deposits belonging to a temperate glaciation which took place more than five million years ago.

This glaciation was already known; the latest discovery indicates that there were two glacial advances separated by a period of milder climate when the glaciers retreated. The deposits found by the party are different from those associated with present-day glaciers in Antarctica. They are separated by gravel beds deposited by rivers and streams.

Some of the deposits are carbonaceous and may contain pollen grains from plants of the period. Identification of them will enable the glaciation to be dated far more accurately.

Christmas Gifts for N.Z. Teams

New Zealanders at Scott Base and Vanda Station will have home-made biscuits and fruit cake again this Christmas to add to the usual seasonal delicacies. Early this month 133 dozen biscuits and four cakes were flown from Christchurch to the Antarctic.

Each year for the last 11 years members of the Canterbury branch of the New Zealand Antarctic Society have sent biscuits and fruit cake to Scott Base for Christmas. This year the biscuits — a record number — and the cakes were baked by 15 women, nearly all of them members of the branch.

Men working in the field hundreds of miles from Scott Base also share the Christmas gift, provided that re-supply flights can be made in time. Otherwise the biscuits arrive for the New Year celebrations.

The biscuits and cake are eaten, but the plastic or polystyrene trays in which they are packed, and the plastic wrappings, have to be returned to New Zealand. This is in keeping with the New Zealand policy of protecting the environment.

The New Zealander Commissioner for the Environment (Mr I. Baumgart) who made a familiarisation visit to the Antarctic this month, has praised the New Zealanders working on the continent for the great care they are taking to protect the environment. He has noted that field parties are bagging their rubbish and returning it to Scott Base or even New Zealand.

In the past rubbish was dumped on a tip and burned in a tip at Scott Base. Now it is burned in a special incinerator because much of the material, particularly plastic, does not decompose in the Antarctic climate.

ANTARCTIC COOKING CLASSES

Several New Zealanders who spent last winter at Scott Base returned home in a better position to cook for themselves. Every Tuesday night for 10 weeks they attended a cookery class run by the base cook, Mr R. Colliver, who is now back on the job as a chef in an Auckland hotel.

Eight New Zealanders attended the cookery class, and three Americans, who went specially to Scott Base from McMurdo Station for the tuition. News of Mr Colliver's good home style cooking may have attracted the Americans. During the winter 90 men from McMurdo Station, in groups of 12, went over to Scott Base every second Friday to enjoy a four-course dinner.

Most of what was taught at the cookery class was elementary. But hints about making pastries and decorating cakes were popular with Mr Colliver's pupils. He had an interest in teaching his colleagues to cook. They were able to prepare Sunday meals on his day off.

Most of Mr Colliver's holidays from a hot stove were spent with a camera. He also took a correspondence course in hotel management, and learned to play the Spanish guitar well enough to give occasional performances at McMurdo Station.

Two members of the winter party made wool rugs as a hobby, and all the New Zealanders made good use of a pool table given to the base by the Canterbury branch of the New Zealand Antarctic Society. The table was in use three to four hours a day.

Mr Colliver did not spend all his time cooking for hungry men. He and most of the New Zealanders managed to visit the Amundsen-Scott South Pole Station, and Mr Colliver also took part in the re-supply of Vanda Station, 80 miles west of Scott Base, and made a 10-mile journey to Tent Island in McMurdo Sound.

ANTARCTIC MEMORIAL SERVICE

A memorial service in remembrance of 41 Americans and two New Zealanders who have died in the Antarctic since 1946, was held in Christchurch Cathedral on the morning of October 6, two days before the start of the summer season's operations on the contintent. During the service, attended by about 500 people, the flags of the United States, New Zealand, and the National Science Foundation were paraded, and an empty sledge bearing two ice axes was dragged behind them in memory of two Americans who died last season.

Readings from Antarctic history and literature were given by Mrs H. Holmes and Mr J. A. Cross, president of the New Zealand Antarctic Society. Bible readings were given by Captain E. W. Van Reeth, commander of the United States Naval Support Force, and Mr R. B. Thomson, superintendent, Antarctic Division, Department of Scientific and Industrial Research.

Commander T. Kirkpatrick, United States Coast Guard, introduced a recorded message from Rear Admiral George J. Dufek, U.S.N. (retd), first commander of Operate Deep Freeze from 1954 to 1959. He said that Antarctica had gradually become safer and more comfortable but its environment was still the most hostile to man on the face of the earth. The cost in money and lives of the United States programme on the continent had been high but worth it for science.

Prayers were offered for those going south for the new season, and the sermon was preached by the Rev. Angus McLeod, general secretary of the New Zealand National Council of Churches.

After last year's service the United States Navy and the United States Antarctic Research Programme presented the city of Christchurch with seven trees representing the world's seven oceans. This year the gift was recognised by the presentation by the Mayor of Christchurch (Mr N. G. Pickering) to Captain Van Reeth of a plaque. It was attached to one of the trees which now stand in the centre of the city, Cathedral Square.

Memorial Cross Re-erected

The jarrah wood cross erected on Observation Hill, overlooking McMurdo Station, in memory of Captain Scott and the four men who died with him on the return journey from the South Pole, is now firmly upright again after being blown down last winter. Two storms toppled the cross, which has been on the summit of the 830ft hill for 61 years.

Late in September a party of New Zealanders from Scott Base climbed the hill and put the fallen cross back in its hole. They packed rocks around and secured the base with "Antarctic cement" (water).

Winds of up to 100 miles an hour, which might have damaged more modern buildings, left Shackleton's hut at Cape Royds unscathed last winter. Men from Scott Base found no signs of damage when they visited the 66-year-old hut early last month.

A dog team had its day at Scott Base on December 3. It left the base with a geological field party because all the Motor toboggans normally used for most field trips were fully committed. With the field party was the base dog handler, John Stevens, of Christchurch.

Dogs were the basic transport for New Zealanders in the Antarctic from 1956 onwards. But in the last few years they have been replaced almost entirely by motor toboggans, and are now restricted to local trips from Scott Base.

ANARE REPORT

Australian Party Will Make Survey in Enderby Land

Scientists of the Australian National Antarctic Research Expeditions will make a survey in Enderby Land this summer. They will operate from a base about 400 kilometres west of Mawson, and will have helicopter and aircraft support. The programme will include aerial colour photography, geodetic and geological surveys, establishment of ice movement markers, gravity and magnetic observations, and a biological survey.

Once again the Danish ice-strengthened Nella Dan will provide the main support for ANARE parties. She relieved Macquarie Island in November, sailing from the New Zealand port of Lyttelton, and returned to Melbourne on November 29.

Early this month the Nella Dan sailed for Mawson to disembark members of the Enderby Land summer part, and the team for the base. In accordance with ANARE custom the Minister for Science (Mr W. L. Morrison) gave the expedition an official farewell from the wharf.

The leader of the expedition is Mr E. Macklin, acting administrative officer of the Antarctic Division, Department of Science. He has wintered twice in Antarctica, and has led many previous relief expeditions.

Also on board the Nella Dan were some members of the 1975 Mawson team, and the officer in charge, Mr L. H. Macey, and next year's party for Davis with the officer in charge, Mr G. C. Colback. The relief expedition also included a Japanese observer, Dr Yoshikuni, a cryobiologist from the National Institute of Polar Research, Tokyo, and four men from the Australian Army, who will assist in unloading operations, using amphibious vehicles.

BASE CAMP

Base camp for the Enderby Land summer field operation will be at Knuckey Peaks, about 400 kilometres west of Mawson. Men from the 1974 expedition made a spring tractor-train traverse from Mawson to Knuckey Peaks to establish depots of fuel and other supplies in readiness for the operation.

The leader of the Enderby Land party is Mr G. W. McKinnon, a geographer with the Antarctic Division. There are also two glaciologists, a medical officer, and a biologist from the Antarctic Division; two geologists from the Bureau of Mineral Resources (geology and geophysics); and five surveyors from the Division of National Mapping, Department of Minerals and Energy.

Some members of both the 1974 and 1975 Mawson expeditions will take part in the operation. Seven members of a civil air component will fly and maintain three Hughes 500 helicopters and one Pilatus Porter fixed wing aircraft in support of the party. An additional officer from the Bureau of Meteorology will be stationed at Mawson during the summer to provide weather forecasts for the flying operations.

From Mawson the Nella Dan will proceed to Davis to unload stores and equipment for the year, and exchange the 1974 and 1975 winter parties. A small construction party will remain at Davis for party of the summer to erect a new biology building.

The Nella Dan will then sail for Freemantle with the returning 1974 winter party from Davis on board. Depending on ice conditions and other factors, she is expected to return to Freemantle on about January 25 next year.

Because the Nella Dan could not return to Melbourne in time for the Macquarie Island voyage, the 25 members of the relief expedition were flown to Christchurch, and joined the ship at Lyttelton. Supplies for the party were bought in Christchurch and loaded aboard the Nella Dan.

Although they sailed from Lyttelton instead of Melbourne, the expedition was given the customary official farewell, this time on board the ship, by an Australian. The High Commissioner to New Zealand, Mr B. C. Hill, flew from Wellington to wish the men, and two boy scouts making the return voyage, a safe voyage and a successful term on Macquarie Island.

OUR OLDEST LIVING EXPLORER

Antarctica's oldest living explorer, Hugh Blackwall Evans, who was assistant zoologist with the Southern Cross expediton of 1898-1900 to Cape Adare led by C. E. Borchgrevink, celebrated his 100th birthday on November 19. Mr Evans, who has been in bad health most of this year, is now in hospital at Vermilion, Alberta, where he retired after many years of farming in Canada.

Hugh Evans, who was born in Chepstow, emigrated to Canada, where he attended an agricultural college and worked as a hired hand. He returned to England in 1897, and then went to Australia, where he joined a sealing expedition to Kerguelen Island. There he collected specimens for Lionel Rothschild and the Tring Museum, worked for the naturalist, Robert Hall, learning taxidermy, and sent home an albatross with a wing span of five metres.

In 1899 Hugh Evans joined Borchgrevink's expedition, and was one of the ten men left at Cape Adare, where the party spent a year. When the Southern Cross returned in 1900, the Ross Ice Barrier was charted afresh.

Hugh Evans was one of a small party led by Borchgrevink which made a short sledge journey over the barrier to Latitude 78deg 50min S. For two years and a half until Scott made his long journey, Evans and his colleagues shared the distinction of having stood at the "farthest south."

Hugh Evans is the last link with the pioneer expedition of discovery and research led by Sir James Clark Ross in the Erebus and Terror in 1839-43. When he returned from the Southern Cross expedition, he met and talked to his maternal grandfather's friend, Sir Joseph Dalton Hooker, who was the biologist with Sir James Clark Ross.

B.A.S. ACTIVITIES

Heavy ice and bad weather delay ship and aircraft

Heavy sea ice off the west coast of the Antarctic Peninsula, and bad weather over several bases, caused some delay to relief operations by ships and aircraft of the British Antarctic Survey early in the season. The Royal Research Ship John Biscoe was unable to reach Signy Island, and the Survey's two Twin Otter aircraft were held up at Punta Arenas for five days on the way to Adelaide Island.

The John Biscoe sailed from Southampton on October 1 with 22 men for the bases. After an uneventful voyage she landed a party of men on Doumer Island, near Anvers Island. From there the party was flown to Marguerite Bay by the Survey's two Twin Otter aircraft. The party included glaciologists, who are making ice depth measurements, both on the surface and from the air, in the area south-east of Marguerite Bay.

Heavy sea ice prevented the ship from continuing further down the west coast of the Antarctic Peninsula, so she then turned north to relieve the bases on Signy Island and South Georgia and to assist field parties. Signy Island was also inaccessible so she proceeded to South Georgia.

Field work this season in the northern areas includes land-form mapping on South Georgia and the South Shetlands, the study of the moraines of glaciers of different thermal regimes, and marine and fresh water biology. The latter projects involve diving in standard wet suits, and the biologists are being assisted by a professional diver.

A party of geologists will work also at the south-eastern end of South Georgia. This area has rarely been visited because it is very difficult to land there. At the same time a diving team from H.M.S. Endurance will work in the area with B.A.S. men on a survey of the seabed.

After Christmas the John Biscoe will proceed to the South Shetlands, and the Antarctic Peninsula bases.

When the Royal Research Ship Bransfield sailed from Southampton on November 7 she had a new master, Captain Stuart Lawrence. He has succeeded Captain Thomas Woodfield who resigned at the end of last season on his appointment as an Elder Brother of Trinity House.

The Bransfield's first port of call was Norfolk, Virginia, where she took on supplies for the Americans at Palmer Station on Anvers Island. On the Atlantic crossing she ran into very rough seas and damaged her rudder. She was put into dock for repairs before she sailed for Montevideo to embark senior B.A.S. staff touring the bases, and American biologists for Palmer Station.

After relieving Palmer Station the Bransfield will pick up more stores from the Falkland Islands and then visit all the main bases except Stonington Island. Stonington Island and the advance base, Fossil Bluff, in George VI Sound, which is relieved by air from Adelaide Island, will be closed for the winter in future, and therefore are not being re-supplied.

SCOTIA ARC

Four geologists were among the 26 passengers on board the Bransfield. They will spend several months in the South Shetlands mapping ancient volcanoes and searching for fossils. Their primary aims are to provide information on the geological relationships between the South Shetlands and South America, and on past climates. They will be accompanied by two geophysicists from Birm-

ingham University, who will collect volcanic rock for radiometric dating and chemical analysis as part of the long-term investigation of the Scotia Arc.

A glaciologist on board the Bransfield will join three others at Fossil Bluff. There the four men will take part in an international programme to study the response of the Antarctic ice-sheet to present climatic changes.

After being held up at Punta Arenas for five days waiting for the weather to clear over the Antarctic Peninsula, the Survey's Twin Otter aircraft arrived at Adelaide Island from Canada on October 17. The party from the John Biscoe was picked up from Doumer Island, as planned, but the weather then deteriorated over Adelaide Island so the aircraft were diverted to Stonington Island.

Fortunately the weather soon cleared, and flights in support of field parties were able to start almost immediately, one party on Adelaide Island being flown to Rothera Point to reconnoitre a possible alternative site for the base.

OTTER'S FLIGHT

In mid-November one aircraft was flown to McMurdo Station by way of Siple and Byrd Stations, having been leased to the Americans for one month to ferry field parties working on the Ross Ice Shelf Project. This was the first time that a B.A.S. aircraft had been flown in Antarctic beyond British Antarctic territory.

Two B.A.S. men accompanied the pilot and mechanics. They will assist in the field work, which includes seismic sounding, ice coring for stable isotope studies, and ice movement and deformation studies.

Field work from Stonington Island and Fossil Bluff began again at the end of August. Parties from Stonington Island worked again on the Palmer Land plateau, and on the east coast of the Antarctic Peninsula.

Parties from Fossil Bluff worked at both ends of George VI Sound, and the northern group opened the glaciological field station at Spartan Glacier en route. Short journeys were also undertaken on South Georgia, Signy Island, the Argentine Islands, and Halley Bay. But those from the latter two bases were brief holiday trips, not hard work. As usual, the Emperor penguin rookery at nearby Emperor Bay was one of the main attractions for the men at Halley Bay.

SLEDGING RECORD

A document sealed in a bottle and left in a rock crevice at Three Slices Nunatak (68deg 02min S., 64deg 58min W), 34 years ago was found by a field party from Stonington Island, working on the east coast of the Antarctic Peninsula. It was the travel record of the American sledge party which made the first crossing of the Antarctic Peninsula plateau to the coast of the Weddell Sea in November, 1940. These sledgers were members of the East Base party of the United States Antarctic Service expedition of 1939-41, which wintered on Stonington Island under the leadership of Richard B. Black. The West Base party of the expedition wintered at Little America III.

The sledge journeys and numerous air reconnaissances of the Stonington Island group extended the surveys of the British Graham Land Expedition, 1934-37, south-westwards down George VI Sound to the Ronne Entrance (finally proving that Alexander Land was an island) and south-eastwards over the Antarctic Peninsula plateau to the Black Coast of the Weddell.

Three men, Paul Knowles (geologist), Donald Hilton (surveyor), and Harry Darlington (radioman and dog driver) were the first to cross the Antarctic Peninsula and sledge down its eastern coast. They left East Base on November 19, 1940, and after crossing the plateau, sledged south to the Eielson Peninsula (70deg 37min S), before turning back. On January 17, 1941, they returned to their base with 22 rock samples, extensive photographs and survey data, and all but two of their dogs. They covered 683 miles in 59 days.

EXPEDITIONS FRANCAISES

25 Years of Research Work by French in Adelie Land

Expeditions Polaires Francaises will celebrate 25 years of scientific work in Adelie Land next month. The first base, Port Martin, 50 miles east of the present base, Dumont d'Urville, was built in January, 1950, and since then France has sent expeditions south each year except for the period 1953-55. Since 1956 the main base has been Dumont d'Urville, which is located on Petrel Island in the Point Geologie archipelago.

This season the 25th expedition left France by air for Australia to join the Thala Dan at Hobart. The winter party of 34 men is led by a topographical engineer, Claude Volck. It was followed by the summer group which will remain in the Antarctic until February.

The Thala Dan is expected to reach Dumont d'Urville about December 20 if she does not encounter heavy pack ice. She has nearly 600 tons of supplies and equipment for the base, and after they are unloaded, she will relieve the winter party of 35 led by Bernard Barriquand.

SUMMER WORK

During the summer the base will be repaired and extended. The bathrooms and sanitary installations will be renovated ,the kitchen modified and the radio aerial overhauled. Two new shelters will be built, the sea water desalination plant will be completely overhauled and a new platform will be constructed for the Air Force supply helicopter.

A full programme of scientific work will be carried out during the season. Biologists will tour the islands of the Point Geologie archipelago to check on its penguin population of 45,000 birds, and will observe and ring some. More glaciological measurements will be taken along the coast. Ice movement and snow accumulation will be recorded, and maintenance will be done on markers.

Topographical work will be done at Cape Prudhomme to locate an ice-free area where more buildings can be erected. A road for motor vehicles will also be traced out.

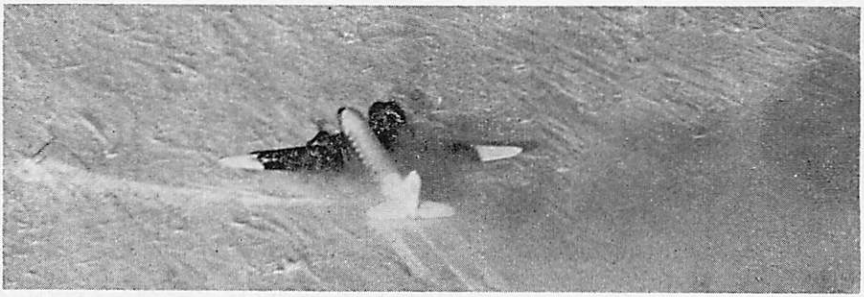
SPECIAL MISSION

A special mission led by Robert Guillard, will make ground preparations for the United States National Science Foundation which wants to recover the wreckage of the Navy Hercules which crashed on December 4, 1971, while making a jet-assisted take-off from the polar ice-cap about 200 kilometres from Dumont d'Urville.

This aircraft provided support for the French scientific traverse party on the first stage of its 2000-kilometre two-year journey across Wilkes Land to the Soviet Vostok Station in the 1970-71 season. Because of mechanical trouble, difficult terrain, bad weather, and low temperatures, the party stopped at the 800-kilometre mark although it planned to cover 1000 kilometres. Similar difficulties forced the 1972-73 party to end the last stage at the 400-kilometre mark.

This season the special mission will prepare a landing strip at Carrefour, the small advance base about 32 kilometres from Dumont d'Urville. It will make weather observations and provide a radio link with McMurdo Station for the arrival of a VXE6 Squadron Hercules reconnaissance aircraft.

A small group will also operate on the ice-cap about 1000 kilometres from Dumond d'Urville. It will make preliminary studies for operations to be carried out next winter. Scientists plan to resume the Wilkes Land glaciological traverse from the region of Dome C, a subglacial dome located about 400 to 500 kilometres south of Vostok.



SOUTH POLE STATION AND ITS BUILDERS

Men have lived and worked at the South Pole since 1957. But after 17 years of occupation the first Amundsen-Scott Pole Station has become unsafe because its buildings and underground tunnels have been slowly crushed under the weight of 35ft of snow. A new station, about a mile from the old station, will be dedicated early next month, and the occasion will mark 20 years of operations in the Antarctic by the United States.

Next winter scientists will live less than one-third of a mile from the geographic South Pole in a complex of buildings housed beneath a geodesic dome 160ft in diameter and 52ft high, and a corrugated aluminium arch nearly 800ft long. The new station, built by Seabees of the Navy's Mobile Construction Battalion 71, has been handed over to the National Science Foundation, and will be the third scientific research station in Antarctica to be manned entirely by civilians.

A geodesic dome was selected to protect buildings from winds and drifting snow.

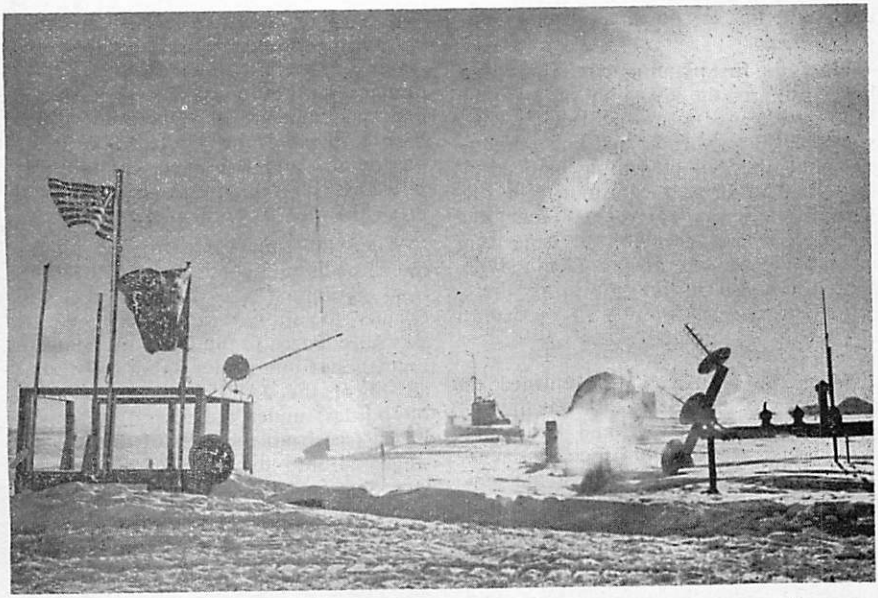
Under the dome are three buildings of modular construction, each two stories high. They house science facilities, living quarters, a library, a store and recreation hall, the dining room, and a conference room. Each building has interior panelling and wall to wall carpet.

Scarlet carpet on the floor, coach-style lamps, overhead fluorescent lighting, and imitation rustic beams, make the dining room the most luxuriously appointed area in the new station, and perhaps in all Antarctica. Other facilities under the aluminium dome include a post office, a photographic laboratory and a small computer for the compilation of data.

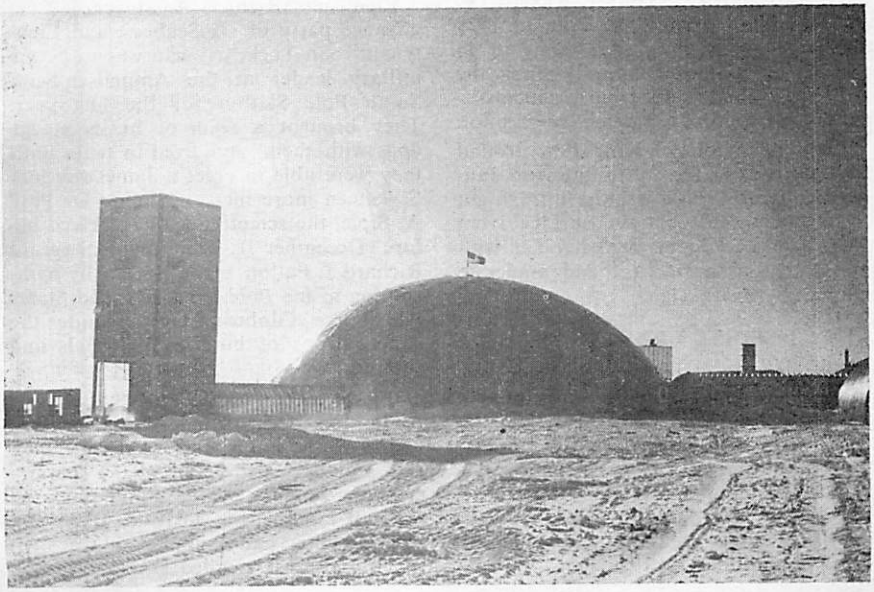
Two other buildings under the 800ft arch house a vehicle maintenance workshop, a biomedical facility serving as a dispensary and research laboratory, and a small gymnasium. Set away from the station under an arch separated by a snow wall 8ft high is a fuel storage area to hold 225,000 gallons of petrol, diesel fuels, and jet fuels.

Close to the geodesic dome is a tower 52ft. high, which will be used for auroral studies. The so-called "skylab" tower's height will afford an unobscured view of the bleak polar plateau surrounding the new station.

Twenty years ago the United States was committed to one of the most difficult construction jobs in history — building a permanent station at the South Pole — almost by accident. Eleven nations were expected to build stations in



POLE STATIONS, OLD AND NEW. **Above is the first Amundsen-Scott South Pole Station, built in 1956, and now almost hidden under ice and snow. Below is the new station, housed beneath a geodesic dome 160ft in diameter, and inside an 800ft long corrugated aluminium arch. To the left is a 52ft tower for auroral studies.** U.S. Navy Photo



the Antarctic for the International Geophysical Year.

When the first planning conference was held in Paris the question of a South Pole station was not raised. But the Russion delegates, who arrived late announced that the Soviet Union planned a station. The French chairman told the Russians he was sorry, and that the conference had accepted the American offer to erect and man a South Pole station because it did not think there should be two stations.

NAVY'S TASK

When the United States returned to the Antarctic, the Navy's task was to support the scientific effort, and build and man seven stations on the continent. The South Pole station was the unknown quantity. Men and materials had to be landed there by aircraft, and during the summer the scientists and Navy men who were to live at the bottom of the world had to be supplied from McMurdo Station 825 miles away.

Little was known of conditions at the Pole, and whether the snow surface was hard or soft. The only records available were those of Amundsen, from December 1911, and Scott, from January, 1912. Rear-Admiral Richard E. Byrd had flown over the Pole in 1929 and 1947 — he flew over it again in January, 1956 — but the only report the Americans had was from Lieutenant-Colonel Hal Kolp, a Marine Corps pilot.

Lieutenant-Colonel Kolp flew around the South Pole for 30 minutes on January 3, 1956 — this was the third flight — and reported that the surface from 500ft appeared to be perfectly flat with long, gentle snowdrifts, and moderate swells up to 3ft high.

FIRST LANDING

Ten months later seven Americans became the first men to set foot on the South Pole since Captain Scott and his party. The first aircraft landing in history was made by Lieutenant-Commander Conrad S. Shinn, piloting a wheeled Skytrain aircraft called Que Sera Sera. The time was 8.30 p.m., and the date was October 31, 1956.

Because of the bitter cold — the temperature was minus 58deg Fahrenheit, the Americans were at the Pole for only 49 minutes. Rear-Admiral George J. Dufek, first commander of Operation Deep Freeze, planted the United States flag on the ice, and two men set up radar reflectors for the aircraft which would bring the men to build the station.

When the time came to take off for the three-hour flight to the small refuelling station at the foot of the Liv Glacier, the aircraft would not move. Its skis were frozen to the ice of the plateau. Lieutenant-Commander Shinn had to fire all 15 of the JATO (jet-assisted take-off bottles) under the aircraft before it broke free from the grip of the ice and staggered into the air. Ten hours later Que Sera ended its historic flight at McMurdo Station.

Because of the intense cold the first Seabees of the construction team were not flown to the Pole until November 20, 1956. By then the temperature had risen to minus 30deg F. Lieutenant-Commanders Shinn and Roy E. Curtis landed eight miles from the Pole itself.

PARACHUTE JUMP

Lieutenant Richard A. Bowers led the advance party of six Seabees, and Lieutenant John Tuck, jr., who was to be the miltary leader at the Amundsen-Scott South Pole Station for the first year. They brought a team of husky sledge dogs with them, and lived in tents until they were able to erect a Jamesway hut. Seventeen more men, including Dr Paul A. Siple. the scientific leader, arrived before December 1. One man, Sergeant Richard J. Patton, made history by parachuting to the Pole from a United States Air Force Globemaster to guide the supply drops of building materials and supplies.

By December 29 the Pole Station was ready for occupation. Nine scientists and a Navy support team of nine men said goodbye to the crew of the last aircraft on January 9, 1957, and prepared for ten months of isolation from the world. They had company — a five-month-old husky called Bravo. But he

was lonely—the other 11 huskies had been flown back to McMurdo Station.

Early in November the first aircraft arrived with mail and fresh food, and the first men to live at the Pole returned home.

For the first few seasons after the pioneers the Pole Station seemed to be the most remote United States station in Antarctica. But the Globemasters and the Skytrains gave way to the ski-equipped Hercules aircraft which carried tons of supplies each season from McMurdo Station in slightly more than three hours. And then, suddenly the men at the Pole found themselves entertaining foreign visitors who arrived by land. Once again the South Pole was the goal of men of other nations.

HILLARY ARRIVES

First to reach the Pole by land since the days of Amundsen and Scott were Sir Edmund Hillary and his four companions. The New Zealanders arrived on January 4, 1958, having driven their three small farm tractors 1250 miles from Scott Base in 82 days.

Next came Sir Vivian Fuchs and his party, which included a New Zealander, an Australian, and a South African. They completed the first half of their crossing of the continent on January 20, 1958, and two dog teams travelled 932 miles with the snocats.

Sixteen Russians arrived at the Pole on December 29, 1959. Alexander Dralkin led the tractor train, which left Mirny on September 27, and covered 1670 miles. The Russians took 18 days to travel 800 miles from Kamsomolskaya, the base at the South Geomagnetic Pole.

The first Americans to reach the Pole by land over an unexplored route were 10 men led by Major Antero Havola, who reached the Pole from Byrd Station on January 16, 1961. They travelled 800 miles in 33 days. Dr Albert P. Crary, chief scientist of the United States Antarctic Research Programme, reached the Pole in early February of the same year. His party of seven men, including a Russian and an Argentinean, travelled 1450 miles from McMurdo Station in 64 days.

In 1965 the Argentine flag flew at the Pole. An Argentine Army expedition of eight men led by Colonel Jorge Leal left General Belgrano Station on October 26, 1965, and reached the Pole on December 10, travelling 825 miles.

Last to make an overland journey to the Pole were the Japanese. On December 19, 1968, a party of 11 men from the 9th Japanese Antarctic Research Expedition, led by Masayoshi Murayama, arrived from Syowa Station. They travelled 3,235 miles in 141 days—the longest journey of all.

Today it is comparatively easy to reach the Pole, provided transport is available to McMurdo Station. Over the years since the Hercules aircraft were brought into use hundreds of men — and six women — have reached the bottom of the world by air. But less than 100 have made the journey the hard way since Amundsen and Scott. There are 82 in this select band, representing eight nations.

PHILATELIC MAIL

Antarctic philatelic mail collectors will be limited to two covers a person this year. Covers, which must be clearly marked in the lower left-hand front corner with "McMurdo Station", should be addressed to: Philatelic Mail Clerk, McMurdo Station, U.S. Naval Support Force, Antarctica, F.P.O. San Francisco, California, 96692.

Philatelists will be advised later of procedures for sending covers to the Amundsen-Scott South Pole Station. United States Antarctic operations this season will end in late February, 1975. All covers mailed after that date will be held until the opening of next season's operations in about the first week of October, 1975.

Covers to be cancelled in Antarctic must have either United States postage or an international reply coupon enclosed to defray postage to foreign countries.

U.S. SCIENCE PROJECTS THIS SUMMER

Geological studies to determine whether the ice sheet in West Antarctica is collapsing, and the establishment of an automatic station to monitor atmospheric conditions on the Polar Plateau, are among the 64 projects of the United States Antarctic Research Programme this season. Scientists financed by the National Science Foundation will work at the five United States stations on the Antarctic Continent, on the Ross Ice Shelf, in North and South Victoria Land, and in the Amundsen and Weddell Seas.

This season programmes at the Amundsen-Scott South Pole Station, and Siple Station at the foot of the Sentinel Mountains in Ellsworth Land, will continue to concentrate on atmospheric sciences, although one project at the Pole will be an attempt to drill to a depth of 100 metres into the ice and obtain a continuous core. The emphasis at Palmer Station and in the Antarctic Peninsula area will be on marine biology and penguin studies. Scientists at McMurdo Station will study seals, penguins, marine life, and Antarctic fishes.

Several projects in the research programme will be carried out in co-operation with scientists of other nations. United States scientists will accompany New Zealand and French investigators in an attempt to descend into the crate of the active volcano, Mount Erebus. They will work with New Zealanders and Japanese in the dry valley drilling project, accompany a Norwegian expedition into the Ellsworth Mountains, and have British, Argentinean, and Chilean assistance in glaciological and geological studies on the Ross Ice Shelf, and in the Antarctic Peninsula area.

Recent glaciological and geological investigations have suggested the strong possibility that ice in West Antarctica, floored largely below sea level, is disintegrating from a full-boded state attained when grounded ice recently filled much of the Ross and Weddell Seas. Continued collapse of this ice would cause world-wide sea level rise, and perhaps would influence climate.

Field work this season by scientists from the University of Maine, will focus on glacial deposits that mantle Beaufort, Franklin, and Inexpressible Islands in the Ross Sea. This continues the project to map the former extent of grounded West Antarctic ice in the Ross Sea, with particular emphasis on carbon-14 dating of the recession of the grounding line southward through the Ross Sea and McMurdo Sound.

ROSS ICE SHELF

Once again surface studies by field parties on the Ross Ice Shelf are included in the programme. This season scientists from the University of Nebraska, the University of Wisconsin, the Virginia Polytechnic Institute and State University, the University of Copenhagen, the United States Geological Survey, and the University of Nevada, will take part in the project. They will continue the research begun in the 1973-74 summer. An additional project will be a study of the major chemical constituents of snow, and precipitation forming mechanisms on the shelf.

Continuing studies include a geophysical programme to make ice thickness, water depth, and gravity measurements, measurement of the ocean tide

beneath the shelf, and the collection of ice cores for isotope studies. To examine the dynamics, history, and stability of the ice shelf strain rates will be measured in a network of stations for the second season of a three-year project.

Scientists will work at last season's base camp at 82deg 30min S., 166deg W., at 82deg 22.5min S., 168deg 38.7min W., the proposed site for drilling through the ice shelf, and on Roosevelt Island and several other locations. Drilling through the ice shelf has been postponed because of delays in assembling the drill and associated equipment. Air support in the field will be provided by Hercules aircraft of the United States Navy's VXE6 Squadron, and a de Havilland Twin Otter aircraft.

AUTOMATIC STATION

Plateau Station, 700 miles from the South Pole in the direction of South Africa, which was closed in 1969, will be the site of the automatic station to monitor atmospheric conditions on the high Polar Plateau nearly 12,000ft above sea level. Wind speed and direction, barometric pressure, air temperature, and power system performance will be transmitted to the Nimbus F polar orbiting satellite and stored by it for later reading by National Atmospheric and Space Administration tracking stations.

Temperatures at Plateau Station may exceed minus 87deg Centigrade, which are too low for standard battery operation. Therefore the station will be powered by either a 10-watt propane-thermo-electric generator or a small radio isotope generator.

Two remote topographic survey mapping operations this season will be conducted by United States Geological Survey engineers off the Amundsen Sea Coast of Ellsworth Land, and in the Ellsworth Mountains. Two engineers will accompany a Norwegian expedition into the Ellsworth Mountains to establish geodetic control to position satellite imagery for revising topographic maps of the Sentinel Range.

With the support of a United States Coast Guard icebreaker two engineers with surveying equipment will made a reconnaissance of Pine Island Bay and Lindsey Island on the Walgreen Coast of Ellsworth land. A reconnaisance of the area as part of a study for a possible deep-water port was to have been made last season. But delay to the icebreaker Staten Island and heavy ice in the area forced the survey to be cancelled.

REMOTE PARTIES

Glacial geology and ice surface reconstructions in the Bowers and Freyberg Mountains of Northern Victoria Land will be studied by two scientists from the University of Maine. They were flown into the area early last month by a United States Navy Hercules aircraft, and will remain there for two months. Another geologist from Ohio State University will study the sedimentary and volcanic rocks in the Scott Glacier region, which is between the Amundsen and Leverett Glaciers in the Queen Maud Range of the Transantarctic Mountains.

On the other side of the Antarctic Continent oceanographers from the Scripps Institution of Oceanography will make a physical oceanographic investigation of the northern and western parts of the Weddell Sea, operating from a Coast Guard icebreaker. This is a continuation of the International Weddell Sea Oceanographic Expedition. An attempt will be made to penetrate the pack ice near the Larsen Ice Shelf to the north-east of the Antarctic Peninsula, a region previously unexplored.

A brief summary of other scientific projects follows.

ANTARCTIC PENINSULA

University of Minnesota. Ecological and behavioural studies of skuas, gulls, and terns begun at Palmer Station in 1973, will be continued during the next two years.

Case Western Reserve University. Study of the sympathetic nervous system in the regulation of blood flow and

temperature responses in the flippers of Adelie penguins. The birds will dive under controlled experimental conditions to determine cardiovascular responses to submersion.

Scripps Institution of Oceanography, Max Planck Institute for Physiological and Clinical Research. Observations of the responses of Adelie penguins to altering central temperatures. Heating central tissue induces eating of snow and increased activity of the salt gland; cooling inhibits these effects. Thermoregulatory responses will be investigated in Adelies implanted with a vertebral thermode.

University of California, Berkeley. Study of radioactive and chlorinated pollutants in Antarctic ecosystems. Large volumes of snow will be extracted near Palmer Station. Chlorianted hydrocarbon residues will be analysed, and lead-210 and plutonium measured, to determine the accumulation of these natural and artificial radioactive fallouts.

SIPLE STATION

Stanford University. Use of the very low frequency transmitter in studies of wave-particle and wave-wave interactions in the magnetosphere. Studies of coupled ionosphere-magnetosphere effects involving electric fields and interchange of plasma.

Universities of New Hampshire and Minnesota. Continued operation of a sensitive micropulsation detector to study generation and propagation of signals near the plasmapause. A similar detector will be operated near the foot of the Siple magnetic field line in Quebec, Canada.

University of California, San Diego. Measurement of ionospheric absorption, and comparison of results with very low frequency and magnetic data recorded by other groups. This will lead to a better understanding of the complex interactions of the sun, the ionosphere, and the earth.

POLE STATION

National Oceanic and Atmospheric Administration. Study of the thermal infrared radiation budget over the station. Surface observation of wind temperature, pressure visibility, clouds, and snow measurements. Upper air observations of the wind and temperature structures above the South Pole to altitudes of 15 miles. Continuance of long-term measurements of atmospheric constituents that can influence climate or shed light on climatic processes.

University of California, Davis, and Stanford University. Selection and installation of data acquisition and computation equipment for the new South Pole station. The system is based on two mini-computers.

University of Maryland. Study of particulate trace elements in the atmosphere. Samples will be collected for trace metal and hydrocarbons, using high volume samplers.

Scripps Institution of Oceanography. Twice a month all the year air will be collected to extend nearly uninterrupted measurements of atmospheric carbon dioxide begun in 1957. These data furnish the most reliable record of the world-wide rise in atmospheric carbon dioxide thus far obtained.

United States Army Cold Regions Research and Engineering Laboratory. A 100-metre drill hole with continuous core will be attempted early in the season. Initial core analysis will be done on the spot before the cores are shipped to the United States. Then the 1967-68 Byrd Station drill hole will be resurveyed. A depth-velocity profile will be obtained for a depth of 1545 metres by comparing data from the 1967-68 survey. The profile will be used to verify ice sheet deformation studies.

University of Bristol, England. Radio echoes returned from the bed of the ice sheet will be used to determine the horizontal and vertical components of ice movement at the surface.

University of California, Los Angeles. Observations of long period earth tides and of earth's free vibrations excited by large quakes (should there be earthquakes of sufficient energy, magnitude 8 or more) will be continued.

DRY VALLEYS

Ohio State University, University of Georgia. Collection of samples for the study of the mechanism of chemical weathering in a polar desert. Examination of various localities in the dry valleys to identify additional occurrences of a volcanic ashfall recognised in the Wright Valley. Geochemical studies of several ponds, and further study of the relationship of the McMurdo volcanics and the glacial chronology of the Wright Valley.

University of Wyoming. Measurement of subsurface temperatures in new and previously completed holes drilled by the Dry Valley Drilling Project. Studies to obtain new data on the thicknesses of permafrost, on paleoclimate, on heat flow, and on the McMurdo Sound region's thermal history.

State University of New York. Relations between Adelie penguins and south polar skuas will be studied at Cape Crozier where breeding penguins are exposed to skua predation. The breeding success of penguins within and outside skua feeding territories will be examined.

Point Reyes Bird Observatory. Study of the breeding biology of nine to 13-year-old Adelie penguins. It is hoped to find how long Adelies live, and how many years a penguin must reproduce successfully to ensure replacement in the population by offspring.

McMURDO STATION

University of Minnesota. Studies of the population dynamics of the McMurdo Sound Weddell sea population will be continued. Underwater spacing of seals in the pupping colony will be measured at Hutton Cliffs, using sonic tags and a hydrophone.

University of Oklahoma Medical Centre. Temperate zone and Antarctic penguins will be collected to analyse their gross and microscopic structure. Most research will be at the University of Otago Medical School, Dunedin, New Zealand.

Duke University. Study of energy expenditure and thermoregulation in fasting Emperor penguins, and the cost of locomotion in little blue penguins. The Emperor penguin will be studied at McMurdo Station, and the little blue penguin at the University of Canterbury, Christchurch, New Zealand.

Bartol Research Foundation, Franklin Institute. Continuously recording high precision cosmic ray detectors will exploit the special advantages of the polar regions for providing information about electromagnetic conditions in space, and about earth's immediate environment.

Ice Will be Cut With Saw in Winter Quarters Bay

To ease the movement of supply ships in Winter Quarters Bay below McMurdo Station this summer, the United States Navy will use a modified trenching machine chain saw to cut through the annual 9ft sea ice. The chunks of ice will then be towed out of McMurdo Sound by Coast Guard icebreakers. This will prevent damage by sea ice to the seaward face of the man-made ice wharf in Winter Quarters Bay.

Last summer Commander T. Kirkpatrick, ship operations officer with the Antarctic naval support force, who conceived the idea of the ice wharf, considered the use of a giant saw to cut through ice 30ft thick, ease the movements of the supply ships in the new season, and face the seaward edge of the ice wharf. ("Antarctic", June, 1974, Page 60).

A company in California uses 16ft chain saws to cut giant trees. The expense of having a bigger saw specially made would have been considerable so it was decided to cut the annual sea ice and not the ice wharf. The sea ice is never more than 8ft to 9ft thick, and an adapted trenching machine will be used. It can cut through ice 10ft thick, the cuts measuring 8in across.

Antarctic support flights favoured by fine weather

United States scientific research in the Antarctic this season will cost $US26.2 mllion. Logistic support of the scientific activities by the United States Navy, Coast Guard and Air Force, will cost $US16 million. The size and scope of the programme are on the same level as those of previous seasons, and the budget is about the same as last season's despite higher fuel costs.

This season the summer airlift of scientists, servicemen, and supplies by Starlifters of the United States Air Force Military Airlift Command was favoured by almost unbelievedly good weather in Antarctica. The first aircraft of the summer flew from Christchurch to McMurdo Station on October 8 with 100 passengers, and mail and fresh food for the men who had been there for more than seven months.

By the middle of November the supply flights were in full swing, and there were few delays to the programme. Up to that time the Starlifters had carried south about 750 men and more than 1,000,000 pounds of cargo, supplies and spart parts.

Early last month the United States Navy began its 20th season in support of scientific activities on the continent. Five VXE6 Squadron Hercules aircraft flew from New Zealand to start the transport of men and supplies to inland stations.

Twenty-one scientists and servicemen at the Amundsen-Scott South Pole Station, who had been isolated for more than eight months, received their first mail from home, and fresh food, on November 2. The Hercules was the first aircraft to land on the new 14,000 skiway at the Pole.

CHANGE MADE

Three days later an historic change was made. The station, which has been operated by the Navy since 1957, was handed over to the National Science Foundation. In future it will be operated by civilian contractors for the foundation. Lieutenant R. Braddock, military leader at the station, and 12 other Navy men, who spent nearly a year at the South Pole, were the last to winter there.

On November 15 a Hercules aircraft made the first visit of the new season to Siple Station, which is at the foot of the Sentinel Mountains in Ellsworth Land, and 1350 miles from McMurdo Station. Four men, all civilian scientists who spent the winter at the most remote American inland station, welcomed the visitors, and the mail, magazines, and fresh food they brought.

Lieutenant Braddock and his men, who spent 363 days at the South Pole, returned to civilisation last month, and in Christchurch looked forward to two months' leave in the United States. Last to leave the station was Chief Petty Officer R. L. Bowers, the third of his name to reach the South Pole.

Horses, lettuce, children, freedom, air and plenty of falling snow were some of the things Lieutenant Braddock's team missed during their isolation at the Pole. They also had trouble in the last month with their home appliances.

One man became a father while he was at the Pole Station. Only eight hours after his son's birth he was able to hear the baby's crying by radio from the United States.

Towards the end of their stay the men had no ice-cream because the ice-cream making machine was out of action. The waffle iron had to be repaired — it was well-used during the winter — and the home-baked bread had to be cut with a knife when the bread-slicing machine was also out of action.

Richard E. Byrd, sculptured in bronze, looks skyward at McMurdo Station.

U.S. Navy Photo

FIRST FLIGHT OVER SOUTH POLE

Forty-five years ago Rear-Admiral Richard E. Byrd became the first man to fly over the South Pole. His flight, on November 29, in a Ford monoplane from Little America to the Pole and back — a distance of 1380 miles, took 18hrs 59min.

On November 29 this year this historic flight was commemorated by the flight of a United States Navy Hercules aircraft of VXE6 Squadron, which has provided air support for American operations in the Antarctic since 1955. The flight to the Pole and back to McMurdo Station took six hours, the Hercules covering a distance of 1650 miles.

When Rear-Admiral Byrd flew over the Pole he carried the Norwegian and British flags in the aircraft as a tribute to Amundsen and Scott. He dropped a small American flag weighted by a rock from the grave of Floyd Bennett, who was with him when he made the first flight over the North Pole.

Commander F. C. Holt, commanding officer of VXE6 Squadron, and his crew re-created the scene when they flew over the Pole last month. An American flag tied to an Antarctic rock was dropped from the Hercules when it was over the flags of the Antarctic Treaty nations which now fly at the South Pole.

Deep hole drilled at Pole

United States and Norwegian scientists have drilled three holes through the ice of Antarctica this season, the first at the South Pole, the second on the Ross Ice Shelf, and the third at Siple Station, near the Sentinel Mountains in Ellsworth Land. The 101.5 metres deep hole drilled under the geodesic dome of the new Amundsen-Scott South Pole Station yielded the deepest core recovered from the Pole, and the drilling was the first scientific project at the station this summer.

A light-weight shallow drill developed by Mr John Rand, of the United States Army's Cold Regions Research and Engineering Laboratory, was used to drill the hole at the Pole. In late September it had been used to drill a 100-metre hole through the Greenland ice-cap. Work began at 9 a.m. on November 19, and the hole was completed at 11.20 a.m. on November 21.

Associated with Mr Rand in the Pole project were Dr Robert H. Rutford, director of the Ross Ice Shelf Project, and two scientists from the Norwegian Polar Institute. An ice-core study team was led by Dr Chester Langway, a glaciologist, who was assisted by Mr Jim Cragin, a chemist from CRREL.

Later the group moved to about the middle of the Ross Ice Shelf where a second 100-metre hole was drilled. Then the men flew to Siple Station to drill the third hole.

Information gained from this season's drilling will be used next season when one event in the Ross Ice Shelf Project will be to drill a hole 30 centimetres in diameter through the 450-metre thick ice shelf. It is hoped to penetrate the ice in about a week, and reach the sediment of the sea bed 275ft below the shelf.

A larger drill, which will have to be carried in a Hercules aircraft to the drilling site has been designed for the work. Drs Rutford and Langway, and Messrs Rand and Cargin, will test this drill in Greenland in preparation for next season.

Next year New Zealanders will take part in the drilling project. They will come from the oceanographic section of the Department of Scientific and Industrial Research, and the Victoria University of Wellington.

AIR BOAT TESTS ON ICE

An air boat driven by an aircraft engine will be tested on Antarctic ice this season to determine whether it is a suitable replacement for tracked vehicles or trucks. The air boat can carry 14 passengers or 5000lb of cargo at 50 to 60 miles an hour in shallow water; its American designer believes it could do the same on ice, provided the surface is not too rough.

Made by the American Air Boat Corporation in Florida, the boat, specially strengthened for ice work, is 20ft long and 8ft wide, and is driven by a 250 horsepower aircraft engine. A large metal canopy is fitted to protect passengers or cargo.

The designer of the boat, Mr A. Smith, says that similar boats have been used successfully in work on the Alaskan oil pipeline from the North Slope field in the Arctic. Mr Smith flew to McMurdo Station this month to supervise the trials of his boat. It will be tested between the ice runway on the Ross Ice Shelf, the Williams Field camp on the sea ice in McMurdo Sound, and McMurdo Station.

If the boat lives up to its designer's claims and proves economical, it will speed up travel between these points. At present the time taken by tracked vehicle or truck can vary, depending on conditions, between 30 and 90 minutes. The boat will be left at McMurdo Station if it is suitable, and more may be used next season. Otherwise it will be returned to the United States.

JARE 16 PLANS

Survey in Yamato Mountains and Mizuho Camp drilling

Glaciological, geological, and terrestrial surveys in the Yamato Mountains area, and a traverse to Mizuho, the small inland camp 185 miles south-east of Syowa Station, are among the planned activities of the 16th Japanese Antarctic Research Expedition (JARE 16) next year and in 1976. Air support on these trips will be provided by a Cessna 185 aircraft. Routine meteorlogical, geophysical, and geochemical observations will be made at Syowa Station, and members of both JARE 15 and 16 will continue deep core drilling at Mizuho Camp next month and in February.

Forty men of the expedition left Tokyo towards the end of last month aboard the icebreaker Fuji, which is commanded by Captain Mamora Morita. Leader of the 1974-75 winter party is Dr Takao Hoshiai, associate professor of biology at the National Institute of Polar Research in Tokyo, who is returning to the Antarctic for the fourth time. Dr Yoshio Yoshida, professor of geography at Hiroshima University, will lead the 1974-75 summer party. Captain Morita is taking the Fuji south for the third time. One of three summer visitors to Syowa Station aboard the Fuji is Dr Tetsuo Tomiyama, of JARE headquarters.

The Fuji left Fremantle about the middle of this month for Syowa Station. She is expected to send her first helicopter to the station about New Year's Day. She will make oceanographic observations in the Southern Ocean after the relief of Syowa Station, and then call at Cape Town early in March to disembark the JARE 14 winter party led by Mr Nozomi Murakoshi, which will return to Japan by air. The Fuji will call at Singapore, and is expected back in Tokyo on April 20 next year.

Ship-board programmes this summer will be routine marine, meteorological, and oceangraphic observations, and radio physics. Near Syowa Station the scientific programme will cover biology, glaciology, geology, cartography, geomorphology, and geochemistry.

FIELD RESEARCH

Research activity at Syowa Station and in the field was described by Mr Murakoshi, leader of JARE 15 in a report received at JARE headquarters on November 22. He said that the Cessna 185 aircraft had made several ice reconnaissance flights over Lutzow-Holm Bay since the beginning of November. It will be used for aerophotogrammetry and to support field parties. Men at Syowa Station are eagerly awaiting the arrival of the new party.

The first party to move into the field was sent to Mizuho Camp at the beginning of September. It found heavy snow cover after the winter inland from Syowa Station.

On October 1 a glaciological party led by Mr Okitsugu Watanabe, who had previous wintering experience with JARE 11, left Syowa Station to make a resurvey of the strain network established in 1970-71 in West Enderby Land. The party will return to Mizuho Camp about January 10.

Four men led by a geologist, Dr Keizo Yanai, left Syowa Station on October 30 to make a geological survey of the Yamato Mountains, and to collect meteorites. Meteorites were first found in the area in 1969 and in 1973 were named Yamato. Dr Yanai's party, which has collected a number of meteorites, will return to Syowa Station next month.

Deep core drilling was resumed at Mizuho Camp at the beginning of this month and two men doing the work will remain there until the end of next month. They expect to drill to a depth of 500 metres, but drilling is behind schedule at present.

Biological and geochemical field surveys around Syowa Station were carried out all winter. The surveys were stopped in the middle of October when the sea ice deteriorated, and trips over it became precarious. Supplementary surveys such as the observation of the penguin rookery will be carried out in the neighbourhood of the station.

A maximum air temperature of 1.5deg C above zero was recorded at the station on November 5. With the return of penguins, skuas, and other birds to the coast biological activities were in full swing.

DRY VALLEY PROJECT

Since the establishment of the National Institute of Polar Research, Japanese responsibility in the Dry Valley Drilling Project, in which New Zealand and the United States are also involved, rests with the director of the institute, Professor Takesi Nagata. Dr Katsutada Kaminuma, a geophysicist, who is an associate professor at the institute, will act as liaison officer with the project while he is in the McMurdo Sound area this season.

Five other Japanese scientists will work in the dry valleys and on Ross Island this season. Messrs Takashi Nishiyama, a geologist at Kyoto University, and Kikuo Kato, a geochemist at Nagoya University, went south in October. They were followed by Dr Tetsuya Torii and Mr Osama Waguri last month. Drs Kaminuma and Hajime Kurasawa, flew to McMurdo Station this month.

Mr Nishiyama will be in charge of X-ray diffraction analysis at McMurdo Station, and Mr Kato will work mainly on hydro-geochemistry. Dr Torii will work at Don Juan Pond in the Wright Valley with the assistance of Mr Waguri. Dr Kurasawa, who is on his second visit, will continue his isotope geology work.

Dr Kaminuma is expected to instal seismographs on Ross Island. He hopes to register volcanic seismicity around Mount Erebus in addition to his main work wtih the Dry Valley Drilling Project.

Members of the 16th expedition, and their scientific disciplines or capacities are:

SUMMER PARTY (1974-75)

Yoshio Yoshida (leader); Taizi Imoto (physical oceanography); Masashi Sue (chemical oceanography); Masao Ohno (marine biology); Masao Ishihara (surveyor); Satoshi Nakanishi (biology); Takatoshi Takizawa (glaciology); Takeshi Kurokawa (drilling engineer); Mituru Wada (construction engineer); Masamichi Otaguro (general assistant).

WINTER PARTY (1974-75)

Takao Hoshiai (leader); Shigenori Sakai (meteorology); Shinichi Okimasa (meteorology); Shigemi Meshida (meteorology); Takahiro Sakamoto (meteorology); Masahiro Manabe (geophysics); Kenji Chujo (surveyor); Hidetoshi Sugiuchi (ionospheric physics); Noriaki Komiya (upper atmospheric physics); Fumiyoshi Ohmi (upper atmospheric physics); Yukio Matsumoto (geology); Masahisa Hayashi (geomorphology); Tsutomu Abiko (geochemistry); Hiroatsu Shimizu (biology); Yuhei Ichimaru (medical science); Osamu Araki (medical science); Noriyasu Sekiguchi (surgeon); Katsuryo Yamazaki (mechanic); Shigekazu Imura (mechanic); Akira Yamamoto (mechanic); Kiyoshi Takigawa (mechanic); Satoru Ito (radio operator); Tetsuo Takaoka (radio operator); Yoshio Itabashi (radio operator); Yukio Endo (cook); Hisayosi Watanabe (cook); Goro Nagata (aviation pilot); Masao Kuroki (aviation engineer); Yasuo Shimada (general assistant); Minoro Funaki (general assistant).

SOUTH AFRICA

SANAE 16 Party Leaves Next Month for Queen Maud Land

Twenty-one men of the 16th South African National Antarctic Expedition (SANAE 16) who will spend 14 months in the Antarctic, are expected to leave Cape Town for Queen Maud Land aboard the research ship RSA on January 18 next year. The team, which is led by Mr E. P. Morkel, of Cape Town, is being trained at Pretoria this month.

When the RSA completes unloading at Sanae Base in Western Queen Maud Land, she will steam northwards through the pack ice to enable scientists from the University of Pretoria to continue seal observations, and for the Bernard Price Institute for Geophysical Research to do research. Then she will return to pick up members of SANAE 15, and scientists and maintenance staff who visited the base for the take-over period. The RSA is expected back at Cape Town towards the end of February.

This year six men wintered at Grunehogna (72deg 02min S 02deg 48min W), the geological base in the Ahlman Ridge mountain range, 215 kilometres south of Sanae Base. The Borga team, led by Mr H. P. Barrand, a radio echo sounding technician, included two geologists, a surveyor and two diesel mechanics.

DEPOTS STOCKED

After the winter five men left Sanae Base to stock depots on the way to Grunehogna. They also visited the base. The geomagnetist in the party used the opportunity to check on previous expeditions' measurements. On the return journey both vehicles used by the party dropped into crevasses, and it took four days to retrieve them.

A second field party left Sanae Base shortly after the return of the first. It worked its way to Borga Base (72deg 50min S 03deg 48min W). This base, established in 1969, is 350 kilometres south of Sanae Base. It is at a height of 7920ft in the Borga Massif, near the Huldreslottet Nunatak.

Field work from Sanae Base (geology, land surveying and radio echo sounding) is progressing well, and the Borga Team is expected back shortly after New Year's Day. The upper air physics programmes at the base are running smoothly.

Thirteen men on Marion Island experienced a cold winter, the water supply being frozen for 16 days at one stage. The team consists of four meteorologists, a radio operator, a radio technician, a medical orderly, one geomagnetist-onosphericist, two zoologists, and three ornithologists.

One of the highlights of the year was a visit by two ships in November. They were the South African Navy's survey ship Protea, and the RSA. The purpose of their visit was for the erection of six refuges at strategic places round the island.

SEAL RESEARCH

The annual relief voyage to Gough Island took place during October and early November. There are eight men in the new team. The leader, Mr Andre Pretorius who is also the senior technician (meteorology) has already served a year at Marion Island, and at Sanae Base.

With the permission of the British Government, a zoologist has, for the first time, been included as a member of the meteorological team. He will conduct a one-year programme of research on the island's seals. Like the programme at Marion Island, this study is carried out by the Mammal Research Institute of the University of Pretoria.

SOVIET NEWS

Veteran supply ship first to reach Bellingshausen

Relief of Soviet stations in the Antarctic began early this month. The veteran supply ship Ob, which began Antarctic operations in 1956, was the first vessel of the 20th Soviet Antarctic Expedition to arrive at Bellingshausen Station, on King George Island, in the South Shetlands, and unload supplies. She will be followed by the research ship Professor Zubov with the new team for the station.

Another scientific research ship, the Professor Vize sailed from Leningrad in the middle of last month with 150 members of the new expedition. A second research ship, the Professor Virvugin, will spend the summer in Antarctic waters with a party of ichyologists from the Pacific Fisheries and Oceanographic Research Institute. They will study the migrations of marine organisms, and measure the temperature and salt content of Antarctic currents.

Scientists at Bellingshausen Station will make meteorological observations, and temperature and weather soundings. They will also continue to collect ice and hydrological data. During the winter they will construct three buildings from aluminium panels.

A ski journey of 1000 miles from the Pole of Cold to the South Pole is planned by a group of Soviet women next year, according to a report in the Moscow newspaper, "Komsomolskaya Pravda." They hope to cover the distance between Vostok Station at the Pole of Cold to the Amundsen-Scott South Pole Station in 50 days.

According to the newspaper report, the group, known as Metelitza (snow storm) will dedicate the expedition to International Women's Year, which the United Nations has declared for 1975.

ARGENTINE POLAR FLIGHT

Two Argentine Air Force Hercules transport aircraft flew from Christchurch to Buenos Aires early this month, crossing the Antarctic Continent, and refuelling at an Argentine base off the Antarctic Peninsula. The two aircraft, which stopped for three hours at McMurdo Sound, had crews of 10 officers and sergeants each, and carried 67 passengers. Of these 56 were officer cadets of the Argentine Air Force Academy, who had made a 22-day instructional flight to countries round the Pacific.

One Hercules left Buenos Aires on November 18, and after visits to Colombia, the United States, Hawaii, Japan, the Philippines, and Australia, reached Christchurch on December 9. The second Hecules flew direct to Christchurch over the South Pole from the Vice-Comodore Marambio base on Seymour Island, off the Antarctic Peninsula.

Last summer an Argentine Air Force Hercules flew from Buenos Aires to Canberra and back by the polar route, landing at Christchurch on the way back to the Argentine. The commander of the aircraft, Vice-Comodore Jose Gonzales, also commanded the aircraft which flew from Vice-Comodore Marambio base to Christchurch this month.

OBITUARY

Charles Green Was Cook on Shackleton's Expeditions

A small Englishman with a high, squeaky voice, who cooked in the Antarctic under appalling conditions on the ice of the Weddell Sea, in the semi-darkness of a primitive hut made from ships' boats, and aboard two ships, died in hospital at Beverley, England, towards the end of September. He was C. J. Green, one of the two survivors of Shackleton's 1914-16 expedition in the Endurance, who was also cook on the last expedition in 1921-22 when Shackleton died aboard the Quest in the harbour at Grytviken, South Georgia.

In 1972 there were three survivors of the 1914-16 expedition. Walter How, an able seaman, died in that year. Charles Green's death at 85, leaves Commander Lionel Greenstreet, R.N.R. (retd.) the sole survivor of the men who reached Elephant Island after the Endurance was crushed in the ice, and remained there for 137 days before they were rescued. Commander Greenstreet, who was first officer of the Endurance, is 85, and now lives in retirement at Worthing, Sussex.

Charles Green, the cheery cook, as Commander Frank Worsley, captain of the Endurance, called him, was both capable and resourceful. His experience in cable ships before he joined the Endurance had been hard. It became harder long before the expedition ended.

Under the most trying conditions Green always managed to scrape together some sort of a hot meal. He did nearly all the cooking for the Weddell Sea party after the Endurance had to be abandoned. His stoves were made from oil-drums, he used seal blubber and penguin skins for fuel, and the food he had to cook included seal and penguin meat, limpets, seaweed, and skua gulls.

Men who served with Green and wrote about their Antarctic experiences have praised his skill, and his remarkable ability to contrive and make shift. Some aboard the Quest believed that, given an ancient pair of seaboots, he could serve up a dinner that would leave those at the Ritz and the Carlton behind.

But the finest tribute to Green can be found in the biography of Shackleton by Margery and James Fisher. They say that of all the men who learned endurance with Shackleton none learned the lesson better or under harder circumstances than Charles Green.

Green was not the original cook of the expedition. The first cook was discharged when the Endurance reached Buenos Aires, and Shackleton instructed Worsley to look out for another. Green, a baker and pastrycook, was aboard a ship in Buenos Aires when he learned from the butcher that the expedition ship was looking for a cook. He obtained leave, went aboard the Endurance, and was engaged after an interview.

After the expedition left the Endurance and camped on the ice Green had to cook his first meals on a stove made from an oil-drum mounted on three boat hooks. It was precarious and only moderately efficient, and not many days after the men had left the ship it lost them a good meal of Irish stew.

Green recalled nearly 20 years before his death how 28 tins of Irish stew were rescued from the Endurance in a case. A pound tin was distributed to each man, and Shackleton told them the cook would heat it up. Green put the tins into the ash bucket, made a good fire on the ice with wood, blubber, and petrol, and a tin can underneath. But

just as he shouted out "Hoosh-O" the bottom fell out of the bucket, and the men lost their Irish stew.

They ate raw meat for a day or two until Green was provided with a better stove. It was made from the ship's ash chute with an oil-drum for the fireplace, and a chimney made of biscuit tins. The ship's wheel-house was put up with sails and tarpaulins on spars to form a galley and storehouse.

Ocean Camp, the Weddell Sea party's first home on the ice, was a mile and a half from the Endurance. Conditions for cooking were not so bad, and Green was able to provide meals far better than those he had to prepare at Patience Camp and on Elephant Island. December 22, 1915, was celebrated as Christmas Day, and once the sledges were loaded for the journey to Patience Camp the next day, the remaining stores were free to all, and Green's menu included ham, sausages, jugged hare, peaches, and baked beans.

TOUGHER CAMP

Patience Camp was tougher. Green's galley was four oars pushed into the snow with an old sail strained round them. He cooked in high winds and freezing temperatures over a portable stove improvised from two oil-drums and scraps of metal. His menus on New Year's Day, 1916, included seal steak for breakfast, flour and water pancakes fried in seal blubber for dinner, and stewed seal meat for supper.

But during the next three months while Patience Camp on its ice floe drifted in the Weddell Sea meals became less satisfying. There were few luxuries except on special occasions. One of these was Leap Year Day when Green was able to produce notable meals—seal steak and onions for breakfast, a flour and dog pemmican bannock fried in blubber for lunch, and penguins' kidneys and Irish stew for supper.

Captain Frank Hurley, the expedition's photographer, refers in his book, "Argonauts of the South", to Green, our capable cook, who continued his duties, undaunted, at Patience Camp. He says that Green's never-ending activities among the flying blubber soots gave him the appearance of a merry chimney sweep who had not washed for months.

ON DRY LAND

After the gruelling journey in the boats, suffering agonies of thirst and cold, and existing on uncooked dog pemmican, the party reached Elephant Island, and there Green was able to cook on dry land. But conditions in the hut made with walls of stone and a roof contrived from two of the boats, the Stancomb-Wills and the Dudley Docker, were even worse than on the ice.

Green did his cooking outside at first but then the cooking stove was rigged inside the hut because enough shelter could not be provided. His cooking was done in twilight gloom, and in an atmosphere of soot, smoke, and the fumes of improvised tobacco.

Commander Worsley describes the scene in his book, "Endurance" in these words: "As the cook, Green, attended to his job, great volumes of black, greasy smoke would pour out and almost stifle the poor wretch. Every two or three minutes he would rush from his 'galley', which consisted of a small sail spread from the rocks to some packing-cases, coughing and gasping, and wiping the tears from his eyes. Long before the meal would be ready he would resemble a very shiny darkie. Wonderful to relate, the grin never left his face."

When Shackleton's 22 men were first marooned on Elephant Island, the indomitable Green showed signs of a breakdown and was relieved temporarily by Hurley. But he recovered and resumed cooking. His soups may have been thin, and there were often strange ingredients in the penguin hooshes, but the men kept healthy because there was so much fat in their diet. They were able to eat thin slices of raw blubber and drink penguin oil without revulsion.

On Midwinter Day, June 22, Green produced a memorable meal—at least to those who ate it. Earlier Hurley had captured a sea elephant which contained 30 undigested fish. These preceded the poultry course which consisted of gulls that had been snared with thread.

And the best dish of all was Green's pudding—12 mouldy nut food bars, 20 mouldy biscuits, and four mouldy sledging rations, all boiled together.

Despite the privations of the boat journey and Elephant Island Green never lost his ambition to go south again. He accepted at once when Shackleton invited him to join the 1921-22 expedition. The original plan was to explore the Beaufort Sea, and Green wanted to be the only cook who had crossed both the Arctic and Antarctic Circles.

When the Quest sailed south one of the crew was a 17-year-old Boy Scout from Aberdeen, J. W. S. Marr, who later had a distinguished career as a scientist in the Antarctic. Young James Marr was steward, stoker, and able seaman in turn aboard the Quest. He recalls in his book "Into the Frozen South" how Green, "an enterprising man who thoroughly revelled in his job," was able to produce meals even when gales washed out the galley fire, and the floor was knee-deep in greasy brine.

An American writer has claimed that the little cook had no sense of humour. Marr disagrees, and offers the evidence of Worsley's birthday. Green produced a noble cake for the occasion, iced to perfection and inscribed with an insulting motto. Worsley was given a boarding axe and instructed to cut the cake.

Worsley did his best but the cake resisted his efforts. Green had carefully iced a 56lb sinker belonging to the Quest's sounding machine.

Edward Wilson watercolours

Four Antarctic watercolours painted by Dr Edward Wilson on Scott's last expedition in 1910-12 have been published in facsimile for sale to the public by the Scott Polar Research Institute. These paintings in full colour have been published because of requests by numerous admirers of Wilson's work, who have been inspired by the reproduction of some of his finest paintings in his Discovery and Terra Nova diaries.

The Scott Polar Research Institute has in its possession the largest single collection of Wilson's paintings and sketches. It has selected four which have been reproduced in facsimile by the collotype process on sheets each measuring 22.5cm by 32cm. The paintings are: "Iridescent Clouds," "Hut Point from the top of Observation Hill," "Paraselena," and "Looking North in McMurdo Sound."

Overseas admirers of Wilson's work who wish to purchase single copies of the facsimiles or the set can order them from the Scott Polar Research Institute, Lensfield Road, Cambridge CB2 1ER, England. Cheques should be made payable to the University of Cambridge.

The cost of each facsimile to overseas customers is £2, and of the complete set £6. They should add 67 pence to the order for surface mail. Packing and air mail postage to New Zealand and Australia costs £2.65p, and to the United States and Canada £2.10p.

R.N.Z.A.F. SUPPLY FLIGHTS

Royal New Zealand Air Force Hercules aircraft of No. 40 Squadron began flights from Christchurch to McMurdo Station last month in support of the United States airlift of men and supplies to the Antarctic. Seven flights will be made this season, the last on December 8.

Last season the R.N.Z.A.F. made 10 flights in Operation Ice Cube. The number has been reduced this season to cut down flying hours and conserve fuel. The first flight south was on November 27, and others on which material for the New Zealanders at Scott Base was carried also, were on November 28, 29, December 2, 4, 6 and 8.

ANTARCTIC BOOKSHELF

Writers continue to find material for books in Antarctica. This year has been marked by the appearance of at least five books about the continent, its natural history, and explorers and scientists who have sought to unlock its secrets.

Captain Scott has been the subject of another study, an American naturalist has written of the birds of the Southern Ocean, and the ice birds, and a history of Ross Island has been produced by an American author and critic. Some of the books have relied more on pictures than words, and the authors have discovered photographs of past expeditions which have not been published before.

Of all the photographers of the Antarctic one man stands supreme today although his pictures were taken more than 60 years ago. He is Herbert George Ponting, official photographer on Scott's last expedition. The pictures he took under extraordinary conditions with almost primitive equipment have become classics. Few have been matched by modern photographers in the Antarctic.

More of Ponting's work appears in a new book, "Scott's Last Voyage Through the Antarctic Camera of Herbert Ponting." The book has been edited by Anne Savours, who was also the editor of Dr Edward Wilson's diary of the Discovery expedition of 1901-04.

Some of the photographs have been reproduced in an English Sunday newspaper's magazine. One of particular interest to New Zealanders is of Thomas Clissold, the expedition's "excellent cook," who came back from the Antarctic to live and die in New Zealand.

Tom Clissold is shown in the kitchen of the hut at Cape Evans rolling out his pastry for rhubarb pies. On the table are two pies ready for the oven, and some open tins of Frank Cooper's rhubarb (presumably the Cooper of Oxford marmalade fame). Against the wall of the hut is a box of Fern Leaf butter, a popular brand in New Zealand many years ago.

The birds of the Antarctic and the waters around the continent are vividly described in "The Sea and the Ice. A Naturalist in Antarctica." The author is Louis J. Halle, well known in the United States as a nature writer and an amateur specialist on seabirds.

Mr Halle travelled south in the Coast Guard icebreaker Staten Island from Wellington in 1970, and saw much of the work of scientists in Antarctica. The Staten Island called at Campbell Island and Cape Hallett, and Mr Halle also visited Scott Base, Vanda Station, and the historic huts at Cape Evans and Cape Royds. Later he flew to the South Pole and Byrd Station.

Captain Scott's complex character is examined in "Captain Scott and the Antarctic Tragedy" by Peter Brent. It is one of the series, Great Explorers, the general editor of which is Sir Vivian Fuchs, and is illustrated with 100 black and white pictures, and 16 pages of colour plates. Ian Cameron, who wrote the story of Magellan in the Great Explorers series, has written also "Antarctic—the Last Continent," which contains many previously unpublished prints and colour photographs.

"Edge of the World. Ross Island, Antarctica" is a personal and historical narrative by an American critic, Charles Neider, who has edited an anthology of Antarctic literature, and written a pocket historical guide to Ross Island. The book deals exhaustively with the Scott and Shackleton expeditions, and has detailed descriptions of the huts at Cape Evans and Cape Royds as they are today.

Mr Neider also writes of United States activities, and his personal experiences on two visits, including the crash of a helicopter in which he was a passenger near the summit of Mount Erebus. His book is distinguished by its 15 excellent maps, and 33 of his own colour photographs.

"ANTARCTIC"

is published quarterly in March, June, September, and December. It is the only periodical in the world which gives regular up-to-date news of the Antarctic activities of all the nations at work in the far South. It has a world-wide circulation.

Yearly subscription for non-members of the Antarctic Society NZ$3.50. Overseas NZ$4.50, includes postage (air mail postage extra), single copies $1.00. Details of back issues available may be obtained from the Secretary, New Zealand Antarctic Society (Inc.), P.O. Box 1223, Christchurch, New Zealand.

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

The New Zealand Antarctic Society (Inc.)

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

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

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

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

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