ANTARCTIC

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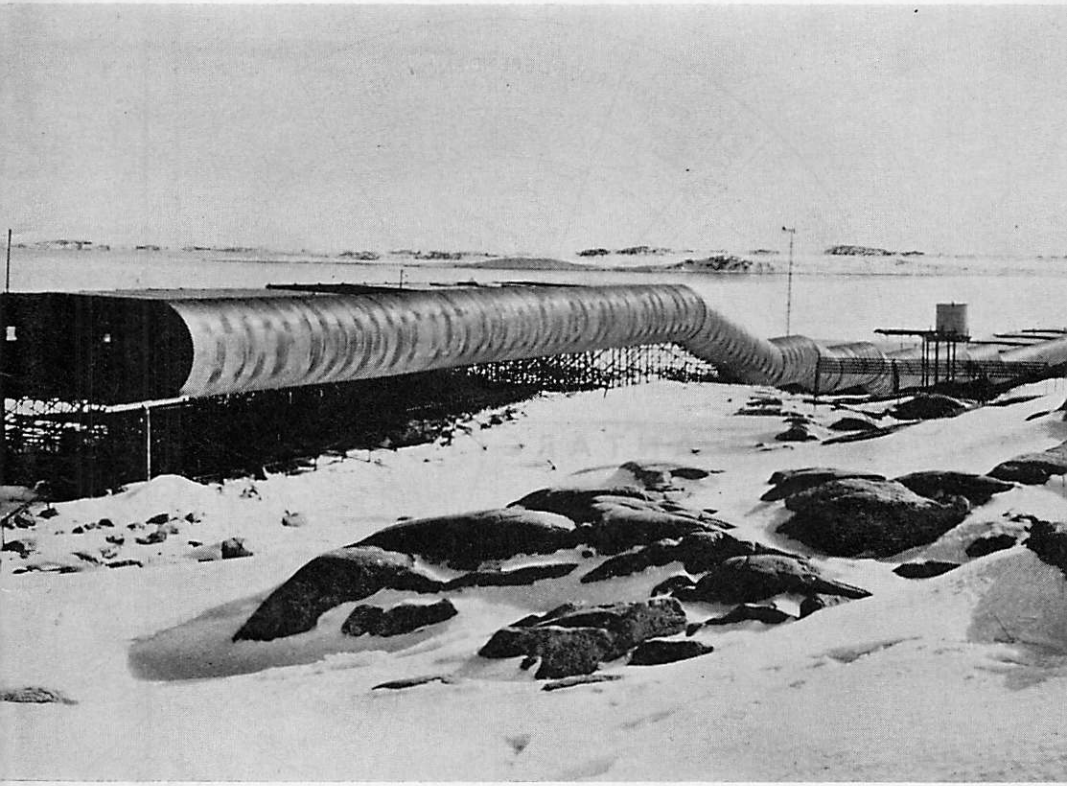
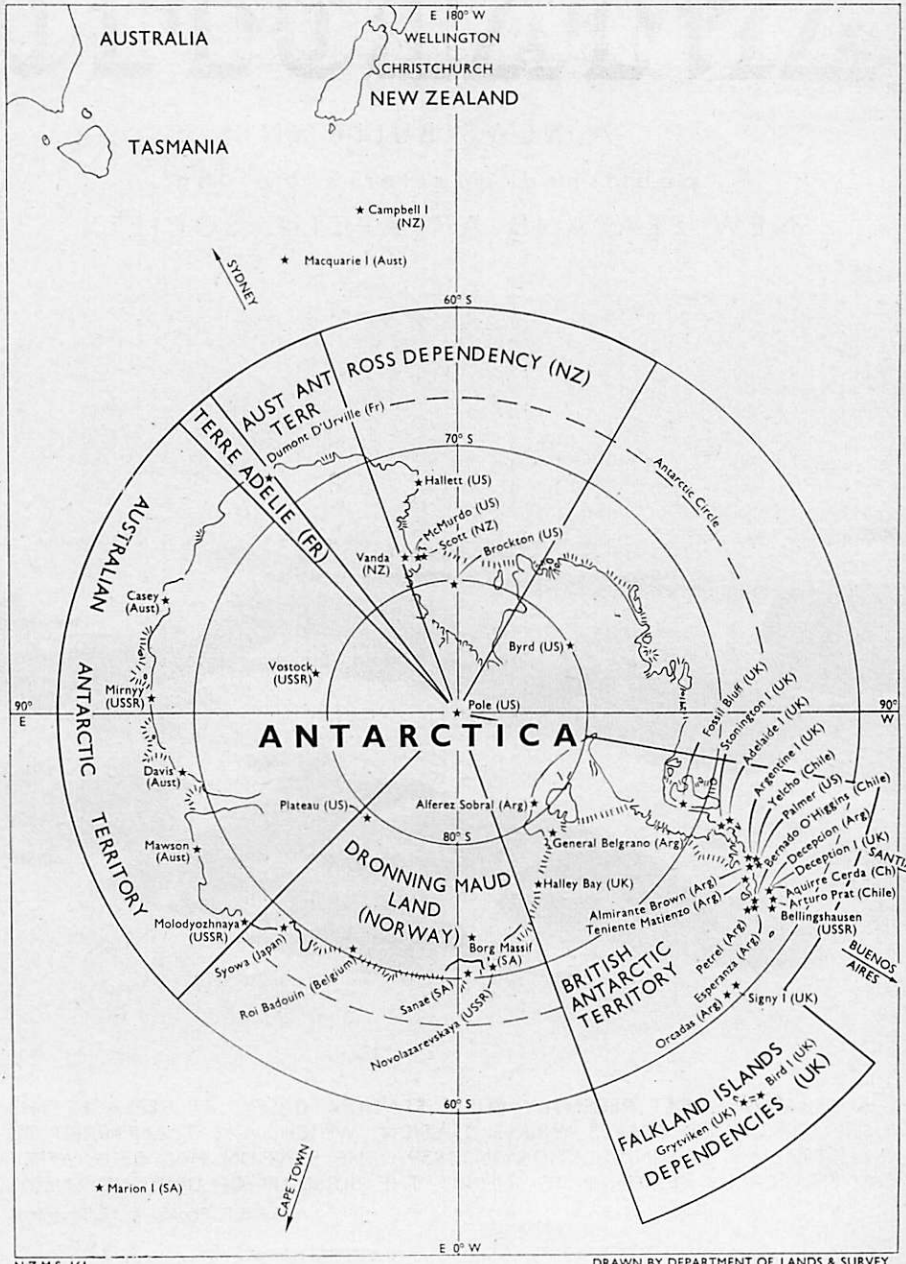


AUSTRALIA'S MOST RECENTLY BUILT STATION, CASEY. IT REPLACES THE FORMER UNITED STATES WILKES STATION, WHICH WAS TRANFERRED TO AUSTRALIAN ADMINISTRATION IN 1959. THE STATION HAS BEEN AERODYNAMICALLY DESIGNED TO INHIBIT THE BUILD-UP OF DRIFTING SNOW.
A.N.A.R.E. Photo—L. N. Saunders.

Vol. 6, No. 3 **September 1971**



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With the advent of another southern summer, Antarctic bases will shortly be humming with new activity as relief staff arrive and the various disciplines and research projects get under way. On behalf of the New Zealand Antarctic Society the editor wishes all Antarctic parties a successful season and a safe return home.

We regret the delay in the issue of the index for Volume 5 of "Antarctic." Arrangements have now been made for the compilation of the index. It should be available to our subscribers before the end of the year.

NEW ZEALAND CURTAILS 1971-72 PROGRAMME

New Zealand's Antarctic research programme for 1971-72 has been slightly restricted because of reductions in national expenditure, and the return of H.M.N.Z.S. Endeavour to the United States. Royal New Zealand Air Force Hercules aircraft will make five support flights instead of the normal three between November and December, but the extra flights will not make up for the loss of the logistic support provided by the Endeavour.

Government field parties and university expeditions have been affected by the national economising. Only one party instead of four will be placed at Vanda Station in the Wright Dry Valley. Three university expeditions will continue their research, but the programme of one has been almost halved, and those of the others have been trimmed. The dispatch of other Government field parties this summer has been deferred to next year.

Vanda Station will be re-opened next month for studies of meteorology, geophysics, and hydrology, and four Japanese scientists will continue their hydrological work there. The station will be closed again in February next year.

This year the members of the New Zealand team did their basic indoctrination course at the Army's training area at Balmoral, Lake Tekapo, for a week last month. For the first time two R.N.Z.A.F. Iroquois helicopters were used in the training programme.

Government field parties will continue the study of hydrology and glaciology, and make more topographic surveys in the Wright Dry Valley and along the surrounding mountains. In the McMurdo Sound area there will be a number of small research programmes concerned with the biological sciences and nuclear sampling.

The Physics and Engineering Laboratory of the Department of Scientific and Industrial Research and scientists from Stanford University, California, will install a whistler mode VLF receiving system at Siple Station.

Geological field parties from Victoria University of Wellington and the University of Waikato will undertake a variety of research programmes in Victoria Land. The University of Canterbury research unit will continue its zoology and marine biology studies at Cape Bird and in McMurdo Sound.

Details of the programme announced by Mr R. B. Thomson, superintendent of the Antarctic Division of the Department of Scientific and Industrial Research, are:—

SCOTT BASE.—Observatory type programmes will be continued at the base and the Arrival Heights satellite station in aurora-air glow, the ionosphere, whistlers and VLF noise, magnetic micropulsations, geomagnetism and earth currents, seismology, and atmospheric potential gradient. Glaciological monitoring studies of the McMurdo Ice Shelf will be continued, and a meteorological programme of more detailed measurements of solar radiation and total atmospheric ozone will be initiated.

VANDA STATION.—Four men will be stationed at Vanda for the summer season. A field party will operate from the station to continue the studies of the unique environment of the Wright Dry Valley. Studies will include: A full meteorological programme; seismology; water balance of Lake Vanda,

entailing detailed hydrological studies of the Onyx River; chemical and physical studies of the lake; mass balance studies of the glaciers in the mountains surrounding the valley; more detailed topographical surveys.

ROSS ISLAND.—Three New Zealanders will take part in an international drilling project on Ross Island. This project, which will begin in December, involves scientists from New Zealand, Japan, the United States, and Canada, in a three-year, three-phase examination of sub-surface geological and geophysical features on and near the island.

UNIVERSITY WORK

VICTORIA.—An expedition of eight men, and one woman, will study the recent volcanic rocks and basement rocks of Northern Victoria Land, and in the McMurdo Sound area. It will also continue the programme of measurement, sampling, mapping, and fossil collection from the flat-lying continental Beacon strata of South Victoria Land from the Skelton Neve to the Mackay Glacier.

WAIKATO.—Four men will continue studies of geomorphology in the Dry Valley syste, of Victoria Land. The main object is to study the development of slopes and the rates of weathering and erosion since the last occupation of the valleys by glacier ice.

CANTERBURY.—Canterbury scientists will continue their studies of Weddell seals in McMurdo Sound. One party will remain at Cape Bird for the summer and will undertake a marine biology programme including marine plankton and marine soft-bottom benthic studies. Its programme of research on penguins and skuas in this area will also be continued.

WINTER TEAM AT SCOTT BASE

Ten men have been selected to winter at Scott Base through 1972. The leader is Major J. R. M. Barker, who has been seconded from the Army to the Department of Scientific and Industrial Research. Last year he served as deputy-leader for the summer season.

Most of this season's team come from the North Island, and all are New Zealand-born except the leader, who was born in Yorkshire. There are two 21-year-olds in the team, and the oldest is 43.

Members of the winter party are:—

Jim Barker (43), Christchurch. Leader (see "Antarctic", September, 1970, Page 473).

John S. Elder (21), Auckland. Senior Scientific Officer. He is completing an M.Sc. degree, and has been working in the physics department at the University of Auckland.

Malcolm S. MacDonald (30), Auckland. Base Engineer. He is a maintenance fitter and welder.

Logan R. McGhie (21), Dunedin. Fitter Mechanic. He is a fitter and turner from Waipori Falls.

David W. Clark (29), Auckland. Fitter Electrician. He is a Ministry of Works station electrician from Whenuapai.

Peter J. McNiell (23), Auckland. Cook. He has been a chef with the Royal New Zealand Air Force at Hobsonville since 1968.

Kevin B. Matson (23), Wellington. Radio Technician. He does the same job in the Post Office.

Allan G. Burgess (23), Ashburton. Postmaster. He is a Post Office telegraphist.

Barry E. Pycroft (23), Christchurch. Technician. He is a telecommunications technician with the Civil Aviation Division of the Ministry of Transport.

John A. Maine (23), Auckland. Technician.

SUMMER SUPPORT STAFF

About 50 men and one woman will work at or from Scott Base, at Cape Bird, and in the Wright Dry Valley, during some part of the 1971-72 summer. They include teams from three universities and the Physics and Engineering Laboratory of the Department of Scientific and Industrial Research.

The solitary woman is Miss Rosemary Askin, of Wellington, who will work with the Victoria University party. She was in the Antarctic last season. Two members of the University of Canterbury team, Messrs J. K. Lowry and D. G. Greenwood, are going south for the fourth time.

SCOTT BASE

B. E. Jefferies (27). Deputy Leader. He is senior ranger at Tongariro National Park.

G. W. Nation (39), Ohakea. Storekeeper. He is an R.N.Z.A.F. storekeeper who was at the base last summer.

B. G. Stafford (22), Marton. Maintenance Officer-Carpenter.

J. N. Foster (24), Temuka. Assistant Maintenance Officer.

R. D. Parkinson (21), Christchurch. Assistant Maintenance Officer.

R. K. McBride (27), Blenheim. Information Officer-Photographer.

R. K. Chambers (22), Invercargill. Radio Operator.

J. H. Bull (27), Greytown. Carpenter.

FIELD STAFF

A. N. H. Chinn (35), Auckland. Field Leader. He is a Lands and Survey Department draughtsman, and in 1967 was deputy-leader of the New Zealand Andean Expedition to Peru.

L. K. Cairns (25), Nelson. Surveyor.

J. Hawes (25), Christchurch. Hydrologist.

W. R. Thompson (22), Dunedin. Hydrologist.

P. H. Jennings (25), Queenstown. Field Assistant.

D. A. C. Bamford (21), Wellington. Field Assistant.

VANDA STATION

C. Johnson (40), Christchurch. Leader. He is a communications officer with the Civil Aviation Division, Ministry of Transport, and has served with the British Antarctic Survey at Halley Bay.

D. Davidson (31), Auckland. Technical Officer.

B. McGuire (27), Auckland. Meteorological Observer.

R. W. Thornton (22), Nelson. Field Assistant.

VICTORIA UNIVERSITY

Dr. P. J. Barrett
M. Laird
P. Kyle
P. Andrews
Miss R. Askin
N. Trustrum
D. Bright

WAIKATO UNIVERSITY

M. J. Selby
B. Rains
R. Palmer
R. Smith

CANTERBURY UNIVERSITY

Prof. G. A. Knox
J. K. Lowry
D. G. Greenwood
G. A. Knight
T. J. Carryer
G. D. Fenwick
P. Sager
W. Farrelly
D. Tattle
J. I. Burnip

DRILLING PROJECT

Dr. P. Webb
Prof. A. T. Wilson
D. J. Burt

CANTERBURY UNIVERSITY'S SUMMER PROGRAMME

Zoology and marine biology studies will be continued by the University of Canterbury Antarctic research unit at Cape Bird and in McMurdo Sound this summer. The unit will also continue its research programme on penguins and seals at Cape Bird

Professor G. A. Knox, co-ordinator and director of the unit's programme says it is divided into three parts: seal research, the study of marine plankton; and the marine benthic study using the trimaran which was taken south last summer.

Seal research will be conducted by Mr D. G. Greenwood, senior technician in the university's zoology department. He will be assisted by Mr J. I. Burnip, the department's photographer, who will go to Cape Bird later to record activities there

A party of four will work at Cape Bird where the major research will be concerned with the ecology of bottom living animals. This summer the leader will be Mr J. K. Lowry, who was deputy leader last year.

Messrs T. J. Carryer and G. D. Fenwick will study marine plankton through the ice near Scott Base. Early in January Mr Carryer will return to New Zealand to join the United States scientific research ship Eltanin. He will collect plankton samples during the Eltanin's cruise in the Ross Sea.

Another zoology department technician, Mr D. Tattle, will carry out diving at Cape Bird. He did some diving with the Americans in McMurdo Sound last season during his studies of seal behaviour.

SOUTH AFRICAN MAGAZINE

The first edition of the South African Magazine for Antarctic Research has just been published by the South African Scientic Committee for Antarctic Research. In future it will be the publication medium for results of original research in various Arctic and Antarctic scientific fields.

The magazine will appear annually and will contain information about research programmes and related activities.

Caretakers at Cape Royds

For the third successive season two members of the New Zealand Antarctic Society will go south to act as caretakers at Cape Royds. The first caretakers in the 1969-70 season were Messrs P. J. Skellerup and M. Orchard; last season the caretakers were Messrs S. Smith and C. M. Satterthwaite.

Applications are now being called for two caretakers to spend three weeks at Cape Royds, starting late in November or early in December. The Antarctic Division of the Department of Scientific and Industrial Research, which will provide special clothing, transport, food and accommodation, has suggested certain qualifications of value to anyone applying.

These qualifications include interest in one or more of the Antarctic research projects, particularly biology or meteorology, and knowledge of and interest in the historic huts at Cape Royds and Cape Evans, and the conservation of fauna and flora. Other suggestions are that applicants should have practical experience in some trade or profession, and mountaineering and or tramping experience.

The two caretakers will be selected by a panel of representatives from the society, the superintendent of the Antarctic Division, and the leader at Scott Base for the 1971-72 season. Applications can be sent to the secretary of the society, P.O. Box 404, Christchurch.

MAJOR U.S. PROJECTS FOR SUMMER SEASON

Byrd Station, the main inland station for the United States Antarctic Research Programme, will be closed as a wintering facility at the end of the 1971-72 summer season. There has been a scientific station in the area since 1957.

The closing of Byrd Station, and the establishment of Siple Station in Ellsworth Land as a winter and summer facility, are two of the major projects in this season's programme, which will involve about 250 scientists, including two women, from 21 universities and research organisations.

Other major projects are a survey of prospective sites for the 1972-73 dry valley drilling programme, an international effort involving scientists from the United States, Japan, New Zealand, and possibly other countries; a glaciological study near Byrd Station; and the remote sensing programme, which includes radio sounding of ice thickness, airborne magnetometry, and aerial photography of seals and glaciers.

Research will be conducted at six stations, and aboard ice-breakers in the Ross, Amunsden, and Bellingshausen Seas. The research ship Eltanin will work in the Indian Ocean and Antarctic waters; the research vessel Hero will continue to operate in the Antarctic Peninsula area from Palmer Station during the summer.

The winter programme at Pole, McMurdo and Siple Stations will continue to concentrate on atmospheric science, and the emphasis at Palmer Station will be on marine biology. The level of scientific effort for the whole year will be about the same as in previous years except for an increase in biological work at Palmer Station.

As a part of the International Antarctic Glaciological Project air support will be provided for French scientists working along the traverse route from Carrefour to the Russian Vostok Station. Carrefour, about 25 miles south-west of Dumont d'Urville Station, was established on the ice cap last season.

A brief summary of each science activity follows.

McMURDO SOUND

University of California, San Diego. Temperature regulation in the newborn Weddell seal. A field party led by Dr D. Hammond, working from McMurdo Station, will continue the research done during the past two seasons. Four young seals will be flown to Massey University, Palmerston North, for further studies of vascular changes.

University of California, San Diego. Physiology and Biochemistry of Freezing Resistance in Antarctic Fishes. Three scientists led by Dr A. L. DeVries will study the adaptations which prevent some Antarctic fishes from freezing although they spend their lives at the freezing point of seawater and use part of the ice as their habitat. Two fish houses will be used on the sea ice of McMurdo Sound for collection of fish.

University of Minnesota. Status and population dynamics of Antarctic seals. Dr Donald B. Siniff will lead a party to study the movement and migration pattern of seals, and collect data on population characters. Radio telemetry and underwater television will be used at Hutton Cliffs, near McMurdo Station to track the animals and monitor their diving and sunning rhythms.

University of Oklahoma Medical Centre. Anatomical study of Weddell Seals. Dr W. J. L. Felts and his party will make an anatomical investigation of adult and young seals, and correlate

the results with previous and present physiological and behavioural studies.

Stanford University. Comparative physiology of the Echinoderm Wall. Mr S. Webster, under the direction of Dr A. C. Giese, will examine the physiology and biochemistry of sea stars and sea urchins in Antarctica and temperate waters.

U.S. Geological Survey. Survey and Mapping in Antarctica. Four topographic engineers and one technician will establish ground control points for the mapping of the ice-free valleys and provide vertical elevations for the dry valley drilling project. They will test a doppler navigation system which could revolutionise mapping and navigation in Antarctica. The party will work in the dry valleys, and at Byrd, Pole, Hallett and Brockton Stations.

U.S. Army Cold Regions Research and Engineering Laboratory. Analysis of Polar Ice Cores. Mr A. J. Gow's party will continue work on the analysis of ice cores from the deep drill holes at Byrd Station, and Camp Century, Greenland. Moraine features will be studied in the McMurdo Sound area, including the Koettlitz Glacier tongue, and the Miers, Garwood, Walcott and Taylor Glaciers.

Virginia Polytechnic Institute. Fresh Water and Marine Antarctic Fungi. Dr R. A. Paterson's party will continue for the second year a study of the fresh water and marine fungi and water moulds in the McMurdo Sound area. It will work in the dry valleys and at Cape Royds.

Ohio State University. Surface Buckling on Meserve Glacier and Adjacent Glacier, Wright Valley. Mr and Mrs M. J. McSaveney will continue research on the Meserve, Goodspeed and Bartley Glaciers. The purpose is to understand the mechanisms of movement, development of surface waves, and erosion of a polar glacier where the interior temperature is always below 0deg C. Investigations of the Meserve Glacier have been conducted for four summers since 1965-66.

U.S. Geological Survey-National Aeronautics and Space Administration. Astrogeologic Studies in South Victoria Land. The geologic features and environment of the dry valleys of South Victoria Land provide one of the best terrestrial analogues of a typical Martian surface. Working in the Taylor and Wright Valleys, Dr E. C. Morris and his party will make comparative terrestrial geological studies for the 1975 Viking Mars Lander imaging investigations.

University of Manitoba. Botanical Studies in Continental Antarctica. In a co-operative programme between the United States and Canada Dr R. E. Longton will analyse edaphic and microclimatic features and study the morphology, growth and reproduction of mosses found near McMurdo Station.

California Institute of Technology. Ecology of Antarctic Micro-organisms. Field work will be carried out for the third season by Mr F. A. Morelli under the direction of Dr R. E. Cameron, to determine the presence of micro-organisms in Antarctic soils. He will concentrate on the areas being surveyed for the dry valley drilling project—the Matterhorm Valley of the Asgard Range and Victoria Valley.

University of Washington. Rates of ionic movement in Low Temperature Soils. Previous studies of soil formation in the Lower Wright Valley have shown that ionic migration, necessary for soil formation, is taking place under very dry conditions and under continuously below freezing temperatures. Dr F. C. Ugolini's party will measure rates of ionic movement, determine soil moisture, and conduct radioactive assays to determine particle size distribution and surface area.

University of Rochester. Investigations of the Microflora of the Dry Valleys. In some cases it appears that certain portions of Antarctic soils are truly sterile even though there exist measurable numbers of airborne bacteria. Confirmation of an earth environment so hostile that it supports no

endogenous microflora has a practical application to planned studies of soil during the 1975 Viking Mars Landing. This project, led by Dr W. V. Vishnfac, will concentrate on the King Valley.

Ohio State University. Glacial Geology of the Willett and Convoy Ranges. Mr P. A. Mayewski's party will examine the glacial and bedrock geology of various nunataks in the Willett and Convoy Ranges and the Coombs Hills for comparison with findings in the Transantarctic Mountains.

University of Maine. Origin and Age of the Mawson Tillite in Victoria Land. A party led by Dr H. W. Borns, Jr., will conduct detailed stratigraphic and sedimentologic investigations of the Mawson Tillite, collecting samples at the Carapace and Allan Nunataks to assist in determining the age and origin of these geological features. Paleontology will also be organised because at Carapace Nunatak there are pond sediments overlaid by a lava flow which contains Jurassic age well preserved specimens of crustaceans, insects and plants.

Dry Valley Drilling Project. This is a co-ordinated, international project involving scientists from the United States, Japan, New Zealand, and possibly other countries. The primary function is the drilling and coring of sediment and rock in the McMurdo Sound region. Located in the most frequented and intensively explored region of Antarctica, McMurdo Sound is a logical site for the first extensive and deep scientific borehole exploration of the continent. This season Dr L. D. McGinnis and a party of more than a dozen will conduct a survey of prospective sites for the 1972-73 drilling programme.

SIPLE STATION

In the Antarctic winter of 1972 research at Siple Station will be conducted on a year-round basis. This summer construction of the 13 mile-long elevated dipole antenna will be completed. Major activity at the site will be the construction of the winter station facilities.

Stanford University. Magnetospheric Research in Antarctic. Mr J. P. Katsufrakis, the station co-ordinator, will conduct magnetospheric and ionospheric investigations which concentrate on the plasmapause region. He will have two assistants in the summer and two in the winter. These investigations are linked with the station's geomagnetic conjugate at Roberval, Quebec, Canada.

Bell Telephone Laboratories. Fluxgate Magnetometer Studies. The BTL three-axis fluxgate magnetometer will be operated on a year-round basis by Stanford University scientists who will winter at the station under the leadership of Dr L. J. Lanzerotti. Data from Siple Station and from three latitudinally orientated stations near Roberval, and a fourth planned in the United States will be used for studies of the conjugate micro-pulsation and magnetic storm characteristics of the plasmapause region.

BYRD STATION

University of Berne. Bore hole Isotope Studies. A party of nine led by Dr H. Oeschger will develop the carbon dioxide extraction technique in dry bore holes. As much as three tons of ice will be melted on the spot, and the released gases will be pumped to the surface for Carbon 14 dating. Meltwater will be pumped to the surface and filtered for the collection of extraterrestrial and terrestrial dust and pollen. The data obtained will be used in comparative studies of climatic changes and model calculations ranging over the last 30,000 years.

Ohio State University. Study of Ice Sheet Dynamics. Thirty miles northeast of Byrd Station a party of five led by Mr I. M. Whillans will remeasure the snow accumulation on the station strain net, and conduct a precision resurvey of the network reference points. The strain net was laid out and surveyed in the summer of 1963-64 by

Ohio State University and U.S. Geological Survey scientists.

POLE STATION

U.S. Army Cold Regions Research and Engineering Laboratory. Deep Core Drilling in Ice. A depth-temperature profile at the South Pole will be determined, using a thermal pendulum probe. The probe will melt its way to the base of the ice cap, 2900 metres below the surface. Temperature measurements will be taken through a sensor. The temperature profile, the known current rate of snow accumulation, and the climatic history of the area, will give a reasonably accurate estimate of the age of the ice at each level in the ice cap profile.

University of Nevada. Natural Concentration of Silver and Iodine in Antarctic Precipitation. Dr J. A. Warburton and his party will collect ice core samples at Pole, Byrd, Siple and McMurdo Stations to determine absolute concentrations of silver and iodine at selected points, and to compare the efficiency of methods of removal of particulate matter from the atmosphere.

University of Rhode Island. Trace Metals and Halogens in the Antarctic Atmosphere. Mr E. Gladney will continue the examination of the particulate concentration of aluminium, copper, iron, manganese, nickel, lead and vanadium, and the halogens bromine-chlorine and iodine in the atmosphere.

Lockheed Missile and Space Company. South Pole Photometric Observations. A summer and winter party led by Dr S. B. Mende will begin a new wintering experiment to investigate the Aurora Australis at the South Pole. To estimate the efficiency of protons and electrons for exciting aurora, the data obtained will be compared with that obtained from a polar orbiting satellite which will be making direct simultaneous measurements of the particles before aurora inducement.

University of Wyoming. Measurement of Submicron Particulate Matter in the Antarctic Stratosphere. Two two-hour flights will be made by balloons carrying a dark field microscope and a photo-electric particle counter. The flights will be made to determine the variation with altitude up to 100,000ft, of the dust particles in the atmosphere over the Pole. Dr D. J. Hofmann's party are seeking information on the origin and global distribution of submicron particulate matter.

HALLETT STATION

University of California, Berkeley. Patterns and Effects of Chlorinated Hydrocarbons on Reproductive Capacity of Antarctic Pelagic Birds. Agricultural and industrial pollutants are now widespread, and sea birds are accumulating high concentrations of some of these compounds. Reproductive failure, due largely to eggshell thinning, has been found in pelicans and cormorants in California, and eggshell thinning has been found in other marine species. Dr R. Risebrough's research, under the direction of Dr H. S. Olcott, will provide additional data on the fallout pattern of chlorinated hydrocarbons over several areas of the world's oceans. A study of the reproductive success of Wilson's petrel populations near Hallett Station and Kerguelen Island will be continued. Eggs of the petrel and other species will be collected to determine thinning in relation to reproductive success.

University of California, Davis. Comparative Biochemistry of Proteins. Studies made for several years of the comparative biochemistry of bird eggs and the blood and muscle proteins of fishes will end this summer. Mr D. T. Osuga will collect fresh Adelie penguin eggs from Cape Hallett for more sophisticated laboratory work.

Iowa State University. Embryology and Incubation Behaviour of the Adelie penguin. A party of six led by Dr J. R. Baker will continue research on the incubation behaviour and embryonic development of the Adelie penguin. It will also study population dynamics, the feasibility of new physiological work, and do annual banding of penguin chicks.

ICEBREAKER PROGRAMMES

University of California, San Diego. Water Characteristics and Flow North of the Ross Sea. Mr J. L. Reid's party of five will work aboard a U.S. Coast Guard icebreaker measuring and analysing the physical properties of the water masses of the Southern Pacific Ocean near the Antarctic Continent. Measurements will include temperature, salinity, oxygen and nutrient content.

University of Idaho. Status and Population Dynamics of Antarctic Seals. A party of five led by Dr A. W. Erickson will work with icebreaker support in the Bellingshausen Sea and/or Amundsen. Its project is designed to determine the pre-exploitive abundance, distribution and status of seal resources.

ANTARCTIC PENINSULA

Research in this area will take place at Palmer Station and in the laboratories of the research vessel Hero in Arthur Harbour, at Norsel Point, Port Lockroy, Melchior Island, the Argentine Islands, Deception Island, Livingston Island, King George Island, and the surrounding waters.

Ohio State University. Glaciology in the South Shetland Islands. A party of four led by Mr O. Orheim will continue mass balance and climatic studies at Deception and Livingston Islands. These studies will be in conjunction with those related to the vulcanology of the area. Scientists from Argentina, Chile, Britain, the Soviet Union, and the United States will make a joint study of the effects of volcanic activity on Deception Island.

Texas Technological University. Population Dynamics of Terrestrial Arthropods. Dr R. W. Strandtmanna will lead a party of three in a continuation of studies made last summer and winter on the population dynamics of terrestrial arthropods. The work will be done at Palmer Station.

University of California, Davis. Bioenergetics of an Antarctic Ecosystem. At Norsel Point Dr F. E. Strong's party will continue studies of the energetics of an entomological community. These studies were started last season.

University of California, Davis. Biology and Ecology of Shallow Water Benthic Foraminifera. This new project will examine the distribution of shallow water foraminifera, and the relationships of shallow and deep water forms. Specimens will be collected by scuba diving and grab sampling from the Hero, and Dr J. H. Lipps will lead a party of four.

University of California, San Diego. Biology of Deep Diving Antarctic Birds and Mammals. At Palmer Station Dr G. L. Kooyman will complete three years of investigation of the hyperbaric physiology and deep diving behaviour of birds and seals. He will examine the mechanical properties and lung architecture of leopard and crabeater seals, and available birds, to compare their responses to pressure changes.

Utah State University. Anti-predator and Social Behaviour of Penguins. Working at Palmer Station and on Deception Island, Dr D. Muller-Schwarze and his wife will observe the anti-predator and social behaviour of various penguin species. They will apply the data gained at Cape Crozier where they studied the Adelie penguins' nesting, egg laying, creche behaviour, and development of young.

REMOTE SENSING

Remote sensing activities continue to play an important role in the U.S. Antarctic Research Programme. This summer there will be programmes in radio ice-thickness soundings, airborne magnetometry, and aerial photography. The radio ice-thickness measurements and aerial photography will be made with a Hercules aircraft, and the magnetic survey will be conducted by the new turbine-engined helicopters.

Scott Polar Research Institute. Airborne Radio Ice Thickness Survey of Antarctica. The director of the institute, Dr G. de Q. Robin and his team, working primarily in East Antarctica, will make a series of ice thickness sounding flights principally in support of the International Antarctic Glaciological Project.

NAVY'S LOGISTIC SUPPORT FOR DEEP FREEZE 72

About 2000 men from the United States Navy, Army, Air Force, and Coast Guard, including about a dozen specialised units, will take part in support activities in the Antarctic this summer. Rear-Admiral L. B. McCuddin, the new commander of the United States Navy Antarctic Support Force, says that the American scientific and support effort will be about the same size and scope as in the past.

The season will begin officially on October 8 when Rear-Admiral McCuddin will lead the fly-in of four Hercules aircraft from Christchurch to Williams Field, McMurdo Station. This season he will have three Coast Guard icebreakers, the cargo ships John R. Towle and Wyandot, and the tanker Maumee from the Military Sealift Command, to support the planned summer operations. The Maumee will deliver about six million gallons of fuel to McMurdo Station.

In the next few months more than 1800 passengers and about 100 tons of cargo will be flown from the United States to Christchurch. More than 1750 passengers and about 550 short tons of cargo will be taken on to McMurdo Station. The winter population at American stations will grow to more than 1000 by mid-summer.

Navy Seabees will have a heavy construction programme this season. They will complete the site of a new Siple Station in Ellsworth Land, and continue work on the new Amundsen-Scott South Pole Station, which was started last year.

Pole Station will be built with prefabricated sections and about 500ft of archway covered like a giant bubble with a geodesic dome 164ft across and 50ft high. This type of construction is new to Antarctica. The dome is designed to withstand 125 m.p.h. winds and snow loads of up to 120lb a square foot at the peak. Studies have shown that this type of structure will reduce the incidence of drifting snow and result in longer life for the station.

The new station is scheduled for completion by the end of the 1973-74 season. It will not be occupied until late in 1974 or early in 1975.

Byrd Station, deep in Marie Byrd Land, will be closed as a winter facility after 10 years. Its buildings have settled since it was dedicated on February 13, 1962, and are now 40ft to 50ft below the surface. When Seabees and Antarctic Support Activities men have removed about 300 tons of scientific equipment and materials, and crated them for removal by Hercules aircraft, the old station will become a refueling point on the air route from Williams Field to the new Siple Station.

Two hundred Seabees will make improvements to the living facilities, roads, fuel lines, and other structures at Williams Field, near McMurdo Station. A new sewage treatment plant will be installed in the station area, and a new incinerator will be built and its furnaces tested. This equipment is being installed because of the need to preserve the ecology of the area.

Almost 15,000 tons of dry cargo will be shipped to Antarctica this season. The Wyandot will unload about 300 tons at Palmer Station early in January, and the icebreaker Southwind, which will stand by for assistance, will leave 50,000 gallons of fuel for the station before it starts a six-week survey of seals in the Bellingshausen and Amundsen Seas.

The Private John R. Towle is expected to reach McMurdo Station about January 15. Its arrival depends on the progress of the icebreakers Staten Island and Northwind in breaking a channel through the McMurdo Sound ice.

Winfly flight ends winter isolation

Seven months' isolation in the Antarctic ended for 161 Americans at McMurdo Station on September 1 when two United States Navy ski-equipped Hercules aircraft landed on the Williams Field ski-way. The aircraft brought from Christchurch almost a ton of fresh fruit and vegetables, and the first mail for the men who have wintered at the station.

On board the first aircraft, which left on its 2300-mile flight at 12.18 a.m. was the new commander of the United States Navy Antarctic support force (Rear-Admiral L. B. McCuddin) who spent only two hours in the Antarctic on his first visit. The second Hercules took off at 12.36 a.m.

The two Hercules, which belong to the Navy's VXE6 Squadron, carried eight scientists, 45 construction workers, the support force chief of staff (Captain H. Swinburne) and the Scott Base engineer, Mr M. S. MacDonald, who went early to learn about the equipment for which he will be responsible during next winter. Cargo for Scott Base included urgently needed spare parts for the five motor toboggans which will be overhauled for the use of the summer field parties.

The first flight of the 1971-72 season, named Winfly by the Navy, was made so that construction workers, meteorologists, and air controllers could prepare Williams Field for the summer support season, which begins next month. The flight was made also to enable university scientists to make an early start on their scientific programmes.

First in the field this summer are Dr D. Hammond, of the University of California, who led a party to study temperature regulations in newborn Weddell seals; Dr A. L. deVries, of the same university, who is studying the physiology and biochemistry of freezing resistance in Antarctic fish; and Dr D. B. Siniff, of the University of Minnesota, who is concerned with the status and population dynamics of Antarctic seals.

When the aircraft returned to Christchurch they brought back about a ton and a half of mail—the first to leave Antarctica for seven months—and about 300lb of baggage belonging to the men who have wintered at McMurdo Station, and who will be flown home next month.

The two aircraft, and a third which had remained at Christchurch in reserve, left for the United States on September 3. All three will return in October.

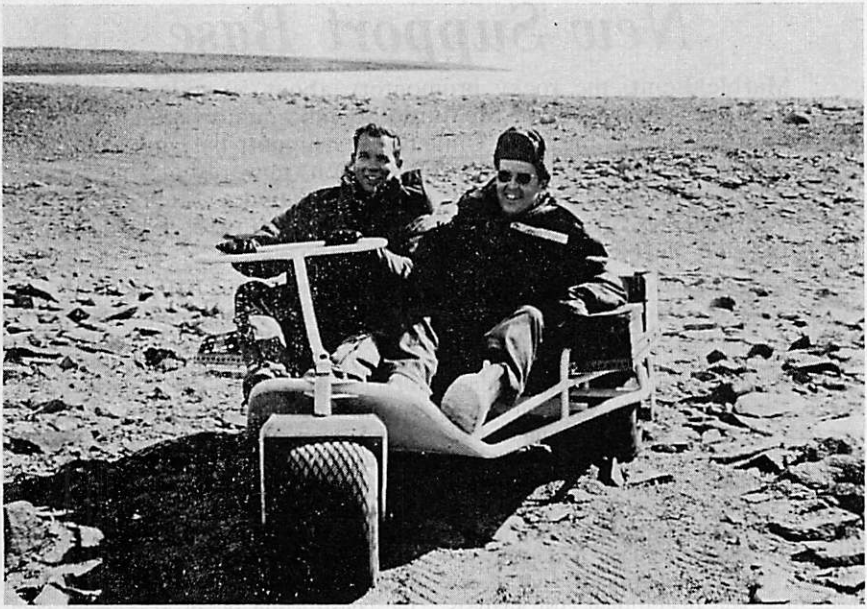
RARE BOOK SOLD

Among the books and manuscripts sold by auction in Melbourne recently was a copy of "Aurora Australis" edited by E. H. Shackleton and published at the winter quarters of the British Antarctic Expedition, 1907.

One of only about 100 copies printed, the book was sold to an undisclosed buyer for $950.

In "Antarctic" (Vol. 5, No. 12, December, 1970) it was reported that two copies of this very rare work were auctioned at Sotheby's in London, one being acquired by the Canterbury Museum for £450 ($NZ961) while the second copy also came to Christchurch, being bought by Mr P. J. Skellerup, a member of the New Zealand Antarctic Society.

ASTRONAUT IN ANTARCTIC



Millions of television viewers last month watched the Apollo 15 astronauts Colonel David Scott and Lieutenant-Colonel James Irwin steering their lunar vehicle on the moon. But only a few New Zealanders and Americans saw Colonel Scott at the wheel of a small New Zealand-built vehicle on land in the Antarctic.

Colonel Scott was in the Antarctic early last year, and made a brief visit by helicopter to the New Zealand station at Lake Vanda in the Wright Dry Valley, where he had lunch with the station's staff.

A New Zealander, Mr G. H. Lewis, of Christchurch, photographed Colonel Scott (left) driving a three-wheeled Gnat across the rocky ground near Vanda Station. The Wright Dry Valley and other dry valleys in Antarctica are regarded as being very similar to the surface of the moon.

Strong Winds Damage Scott's Hut

Gusts of 96 miles an hour recorded at McMurdo Station this winter have damaged the hut built by Scott's first expedition in 1901 at Hut Point, Ross Island.

Mr Brian Porter, of Auckland, leader of New Zealand's Scott Base party, and three members of the winter party, inspected the hut on September 11.

They found a section of veranda damaged and three windows broken. A considerable amount of snow had collected inside the hut, and care was needed in removing it to avoid damage to the many artifacts.

The two other historic huts at Cape Evans and Cape Royds, both of which are more sheltered than the building at Hut Point, will be visited this summer by two members of the New Zealand Antarctic Society, who will do maintenance work on them.

Study of Marble Point As New Support Base

Marble Point, the rocky promontory about 50 miles from Ross Island on the western side of McMurdo Sound, might eventually replace McMurdo Station as the main United States support base in Antarctica. This month the National Science Foundation, now responsible for the financing and management of all American activities, announced that a private research firm will report on the feasibility of establishing a new base at Marble Point.

The study, which should be completed by the end of March next year, will compare the cost of running McMurdo Station against the cost of constructing and running a new facility. International science support needs in line with research programmes, and commercial logistic support needs between 1971 and 1991, will be covered in the study.

Two special projects have been included in the research programme for the 1971-72 season. One is a study of the Marble Point airfield, and a re-evaluation and operational cost analysis of the McMurdo Station runways for wheeled and ski-equipped aircraft. The other will be concerned with the future use of the nuclear power plant at McMurdo Station, and an extensive re-evaluation and cost analysis of the updating of the utilities.

McMurdo Station was established in 1956 as the support facility for Byrd and Pole Stations before the start of the International Geophysical Year. It has three airfields, a port, communications facilities, shops, warehouses, office buildings, a fire station, dispensary, science laboratories, and a barracks for 350 men.

Marble Point is the only suitable site for a permanent all-weather airfield found in a ten-year search of the Antarctic. A feasibility study of the area was made by a survey team in 1957 and 1958. An 1800ft strip was bulldozed by Seabees for use by light aircraft, and survey points were made.

The first landing of a wheeled aircraft on Antarctic earth was made on January 31, 1958, by a VX6 Squadron Otter carrying Sir Edmund Hillary and Rear-Admiral G. J. Dufek, then the United States support force commander. Otter aircraft used the strip in the early years of Operation Deep Freeze, and a small maintenance unit remained at Marble Point to look after the tractors and earth-moving equipment.

After the Marble Point survey which included the collection of data for the siting of buildings, power plants and electronic equipment it was suggested that the United States had plans for the construction of an all-weather commercial airfield to provide an air link on routes between South America, South Africa, Australia, and New Zealand. Estimates of the cost of building such an airfield ranged from 25,000,000 to 100,000,000 dollars.

By 1960, however, the results of the Marble Point survey had disappeared into the files in Washington. Early that year the area was in the news again—as a source of marble, not as an airfield site. Navy helicopters lifted three blocks of marble for shipment to New Zealand where they were used as foundation stones for chapels at three Christchurch hospitals.

Some time later the tractors and earth-moving equipment were brought across the ice of McMurdo Sound to McMurdo Station. Since then Marble Point has been only a name on the map. And before female scientists arrived in the Antarctic, there was a Ross Island legend that Marble Point was the place where women were hidden—well away from the all-male population.

BRITISH EXPEDITION TO ELEPHANT ISLAND

Early in February this year members of a British expedition landed on Cape Valentine, Elephant Island, for the first time since Shackleton's men reached the island in 1916 after the Endurance had been trapped and crushed in the ice of the Weddell Sea. Groups from the 1970-71 Joint Services Expedition to Elephant Island also landed at Point Wild where Shackleton's men were marooned for four and a half months until they were rescued by the Chilean ship Yelcho.

The story of the landings is told in the official report by the leader, Commander M. K. Burley, R.N. He also led a Joint Services Expedition to South Georgia in 1964-65 when it retraced the route taken by Shackleton on his first crossing of the island after he, Worsley, Crean, McNeish, Vincent and McCarthy sailed the James Caird past Elephant Island to seek help for the men left behind under the leadership of Frank Wild.

Fourteen men from the Navy, Army and Air Force and the British Antarctic Survey spent nearly four months on Elephant Island and the other islands of the group, making tographical surveys and scientific studies, and climbing several of the mountain peaks. Before they left England they held a farewell party at which the distinguished guests included the three survivors of Shackleton's 1914-16 expedition, Commander L. Greenstreet and Messrs W. E. Hour and C. J. Green.

Commander Burley's expedition was unique in one respect. It had its own pipe band—a one-man band. Captain C. H. Agnew of Locknaw, Royal Scots Fusiliers, took his bagpipes to Elephant Island.

The Elephant Island group of islands lies some 500 miles south-east of Cape Horn at the eastern end of the South Shetland Islands in British Antarctic Territory. The area of expedition activities embraced six main islands of which Elephant Island is the largest. The weather in this region has a certain notoriety and the occasions when Elephant Island is clear of cloud are singularly infrequent. All the islands in the group are covered with a permanent ice-cap and are mountainous with the highest point on Clarence Island reaching approximately 5500 feet.

The South Shetland Islands were first sighted in February, 1819, by Captain William Smith when his trading brig Williams was blown off course while rounding Cape Horn. The following year, the main island at the eastern end was discovered and named Sea Elephant Island because of the profusion of these seals on the beaches but on charts published in 1822 and subsequently the name became contracted to 'Elephant Island'.

There is little doubt that during the last century and particularly during the 1820's, Antarctic sealing vessels visited Elephant Island in the course of their activities. The first recorded landing, however, occurred in April, 1916, when Shackleton's Imperial Trans-Antarctic Expedition sought sanctuary after Endurance had been crushed and sunk. The expedition had been encamped on the north-west moving pack ice for more than five months and when the ice started to break up, took to its three boats and eventually landed at Cape Valentine. It bivouacked along the narrow beach at the foot of a steep scree cliff but because of the exposed position of the beach stayed only 48 hours.

During this time, however, the men cached ten boxes of sledging rations inside a secure cranny in the cliffs, well above high water mark, for safekeeping should a storm suddenly blow up causing seas to sweep over the beach.

After a reconnaissance by boat along the coast to look for a safer site, the men moved six miles to the west in three boats and established camp on a small spit of land which they called Cape (now officially designated Point) Wild. While Shackleton sailed for South Georgia to fetch help, the other two boats were improvised to form the roof of a makeshift shelter in which the remainder existed until their rescue on August 30, 1916.

The next visit occurred in 1922 when parties from the research ship Quest made brief beach landings at Cape Lookout and Minstrel Bay.

Since these visits, it is understood that small British, Argentine, Chilean and United States parties have been ashore but these landings have all been of short durations and no penetrations inland were undertaken.

CENSUS OF SEALS

In January, 1957, during cloud clearances, Hunting Aerosurveys Ltd. completed aerial photographic coverage of the island group.

Among the aims of the expedition, nearly all of which were achieved, were to survey the Elephant Island group, determine the movement of the main discharge glacier of Elephant Island, and to study the extent and topography of the island's glaciers. It also made representative collections of rocks, terrestrial plants, and soil samples on Elephant Island.

For the first time a census was made of the birds of Elephant Island, particularly of the breeding population. A census of the seal population of the islands was made with particular reference to possible breeding species, sightings of tagged seals were recorded, and also sightings of whale and dolphins at sea and ashore.

Most of the main peaks in the group were climbed. Twenty ascents were made including an ascent of Mount Agnew (5300ft), the highest peak on Clarence Island.

After flying to Buenos Aires the expedition sailed to Elephant Island in the Royal Navy's ice patrol ship Endurance, making a short stay at the Falkland Islands.

SURVEY WORK

Commander Burley writes that the Endurance arrived off Elephant Island under blue skies in the small hours of December 4. The island lay spread out, a glistening blistered white plateau through which reared serrated ranges of black ragged mountains. Closer scrutiny through binoculars showed the apparently regular snow surface to be rent by countless tiers of crevasses shredding the surfaces of successive glaciers as they tumbled down to the sea.

Before disembarkation on Elephant Island a reconnaissance was made of the projected trig points needed for the survey of the island. The Endurance steamed round the coast, her helicopters landing on or hovering over each station to enable one of the surveyors to verify the acceptability of the position.

These points were on a variety of locations, including precipitous rocky headlands, congested penguin rookeries, isolated and exposed rocks miles out to sea, down to which the surveyors had to be winched, and precarious windswept mountain summits. Visiting each site called for a high standard of airmanship by the helicopter pilots who, later, had to land and re-embark the survey teams with all their camping gear and survey equipment.

By the end of December the initial and most important part of the survey work was completed. The four surveyors were brought ashore by helicopter to the base camp on Elephant Island, and the Endurance sailed to continue her programme in more distant parts of Antarctica.

A month later the expedition's isolation was relieved. The Endurance, proceeding northwards to Punta Arenas, closed the island and dropped off mail

and bread by helicopter before resuming her passage.

On February 8 a group from the expedition set out to reconnoitre the cliffs and beaches of the eastern end of the island. As avalanche scarred mountains in the area denied any but a very difficult climbing high approach to Cape Valentine, the party decided to seek a possible route by means of the beach.

After skiing across two glaciers and the ridge, the party kicked steps down a broad snow gully to the beach at the foot of a 700ft vertical rock face.

About half-way to Cape Valentine the party was effectively halted when the mountainside plunged precipitously into the surging sea, with no feasible climbing route across the sheer rock face. Luckily the expedition's boat hove into sight round the headland, and the party was able to motor round to Cape Valentine.

"It was an exhilarating feeling to make the first landing on Cape Valentine since Shackleton's expedition had been there in 1916," writes Commander Burley. "The various cliffs, stretches of shore and islets featuring as backgrounds in photographs taken by Hurley in 1916, copies of which had been obtained from the Royal Geographical Society, were instantly recognisable.

"The only change to the landscape which had taken place was caused by a major rockfall from higher up the cliff, opposite a basalt pillar on the corner, which had buried the lower part of the cranny in which Shackleton had cached some rations. To reach what was originally the bottom of the cranny would involve excavating several tons of rocks, so it was decided to leave the huge pile of debris in the undisputed possession of the scores of nesting chinstrap penguins which were firmly ensconced over the whole mass.

"The next day, the entire expedition visited Cape Valentine with the boat relaying parties across the impassable stretch of the coast. A determined duo resolved to make a further try for the elusive rations but having removed the surface rocks, they found that the lower layers of rubble were solidly frozen and little short of a pneumatic drill would prize the contents free."

All members of the expedition wanted to visit Point Wild where Shackleton's men were marooned. Commander Burley decided that three separate groups should make visits.

The first group of five, led by Commander Burley, left on February 12 from Chinstrap Camp at the eastern end of the island.

To reach Point Wild the men had to ascend the island's main glacier, climb a steep mountain ridge, and then follow the edge of the Furness Glacier beside Mount Houlden. They reached a terminal serac of the glacier about 300ft above the sea.

HISTORIC SPOT

Then they cut steps down the ice face for 120ft to a bank of snow against the mountainside, made a 100yd traverse down the snow slope to the beach, and after a 100yd dash across slippery boulders trying to evade surging breakers, reached the historic spot at last.

"Once again, it was fascinating to scan the features depicted in the backgrounds to the dramatic photographs of Shackleton's expedition," writes Commander Burley. The three changes which were immediately noticeable were that the glacier snout, which in 1916 overlapped the landwards end of the Point, has since receded a full 200 yards. The gravel spit is also considerably narrower than it used to be. . . .

"The site of the expedition's improvised shelter was tenaciously occupied by penguins nesting amongst pools of krill-pink mire; recollections by Shackleton's expedition of the increasingly foetid atmosphere inside the close confines of the shelter as the temperature rose can readily be comprehended. There was no evident trace of the wall of rocks buttressing the upturned boats which is not surprising as this low lying area must have been repeatedly overwhelmed by countless heavy seas during winter storms."

Point Wild is a rocky island connected

to the mainland by a low gravel spit about 20yds long by 6yds wide at high water. The party had to pitch its two tents in the centre of this narrow spit.

"The next two nights were not the most restful of the expedition," is Commander Burley's dry comment. "Two yards to landwards the penguins kept up an incessant and indescribably raucous clatter, pecking periodically at the guys (ropes).

"From one side of the spit the waves sluiced up to within two feet of the tents (we discovered later) and on the other, the brush ice crunched relentlessly a mere two yards away. Throughout all of this, the fur seals cavorted round the tents, shuffling and snuffling with inexhaustible supplies of energy. . . ."

DIFFICULT TRIP

Commander Burley's party had a difficult trip back to Chinstrap Camp. A storm was brewing and the snow conditions were bad. They completed safely the most difficult part of the descent of the mountain ridge, and were walking down the last few hundred feet in what was comparatively the easiest part of the snow slope when an avalanche suddenly swept three men who were on one rope together, some 400ft to the bottom. All lost their ice axes and minor items of equipment but were unhurt.

Commander Burley and his companion on the other rope were near the fracture line and each step they took started an ominous crack from their footprints to the fracture. But they reached the relative safety of the clear avalanche track and descended to join the others. A two-hour journey through a rising blizzard brought the party back safely to camp before the worst of the storm broke.

A second party visited Point Wild almost three weeks later. The snow had deteriorated considerably, opening up many more crevasses, but the men were able to spend a day at Point Wild. They also climbed Mount Houlden.

Spasmodic falls of rock from Mount Houlden, unsuitable snow conditions, and the dangerous state of the snow bridges spanning the crevasses, forced a third party to abandon its visit to Point Wild two days later. However, it was able to climb Mount Houlden and explore the adjacent coastal area.

The topographical survey of Elephant Island, and the eight other islands of the group was the expedition's most important task. It was achieved although wind, cloud and snow hindered progress.

BRITISH SURVEY NEWS

Winter party of 105 men at bases this season

This season the British Antarctic Survey will have a winter party of 105 men at its six main bases and the advance base, Fossil Bluff. Sixty men will go south next month in the R.R.S. John Biscoe and Bransfield, and the twin-engined Otter and the single-engined Beaver will be flown from Canada at the end of the month.

Routine observations and maintenance have occupied the 87 men wintering at the bases. Preparations have also been made for summer field work.

New potatoes grown in the base greenhouse were on the Midwinter's Day dinner menu at Signy Island. All bases celebrated the day in traditional fashion although at Stonington Island merry-making was sandwiched between field trips, and some men were away from the base.

Travel in most areas was hampered when strong winds at the beginning of

July and in the second half of August broke up and dispersed the sea ice down the west coast of the Antarctic Peninsula and in the South Orkneys. At the Argentine Islands, however, sea ice travel was possible in June, and visits were made from the base to the neighbouring islands. Several parties stayed at the old base on Winter Island.

An inland depot laying and dog training trip was carried out from Adelaide Island at the beginning of July. Meteorologists placed a line of nine stakes at eight-mile intervals between the base and the mountains to the north. This was done at the beginning of August to measure snow accumulation over the ice piedmont.

Two survey parties which set off with dogs from Stonington Island at the beginning of June were forced to return after a week because some of the dogs developed foot rot. A later party had to return after travelling only five miles when gales broke up the sea ice. After lying up for a week until the gales abated the party returned to base overland.

Later in June four men arrived at the old British base on Horseshoe Island, from which they were able to carry out geophysical work in the northern part of Marguerite Bay. This group continued field work through midwinter and completed it at the end of July when it returned to Stonington Island.

Other groups from Stonington Island carried out survey and glaciological work locally and on the Antarctic Peninsula east of Horseshoe Island, and laid depots in readiness for summer projects.

After the evacuation of two sick men from the advance base at Fossil Bluff, the two men remaining were able to resume field work in August, investigating ice shelf movement in George VI Sound. They set up a tide gauge at Ablation Point, 35 miles north of the bluff, and did optical levelling across the sound.

A record low temperature of —63.8 deg. F. was recorded at Halley Bay in June. The mean of —25deg. F. for the month was also unusually low, and coupled with winter darkness it restricted outside activities. When the sun rose on August 12 a visit was made to the local Emperor penguin rookery where the current population was estimated at 35,000 birds.

In contrast to Halley Bay, Signy Island in the South Orkneys experienced unusually warm weather at the beginning of June. The mean temperature for the first two weeks was about 20deg F. A widespread thaw and heavy rain were welcomed as they topped up the base reservoir and solved the water supply problems for several months.

Gales in the second half of June broke up the sea ice and restricted travel for most of July. Lack of sea ice also restricted biological sampling in the bay near the base, but all the terrestrial programmes continued without interruption. Trips were made to the west coast of the island to continue observations on Weddell seals.

The weather on South Georgia was also variable. Heavy snow in the first two weeks of July brought problems of drifting up, but this was followed by clear, sunny weather which allowed outside weather to continue. Progress was made with the various scientific programmes which are being built up at this base (surface meteorology, geomagnetism, ionospheric work and biology). Seismometers were set up in June, and after some initial difficulties, were reported to be running satisfactorily.

WAIKATO RESEARCH UNIT

An Antarctic research unit will be established at the University of Waikato. Scientists from the university have already been twice to the Antarctic, and this season a third party will continue studies of geomorphology in the dry valley systems of Victoria Land.

Proposals for the establishment of a research unit put forward by several scientists were approved by the university council last month. Most of the Antarctic equipment needed for the unit is already available.

MEDALLIONS FOR AUSTRALIANS

Bronze Antarctic medallions, one of which is shown above, have been awarded to 164 former members of Australian Antarctic expeditions. The award has been instituted by the Department of Supply, which has been responsible for the Antarctic Division since 1968.

The Minister for Supply, Senator Sir Kenneth Anderson, announced recently that he and his department considered there was a need to recognise the isolation and hardship endured by members of the Antarctic wintering teams at Mawson, Davis, and Casey Stations. He said that an expedition could achieve its purpose only through a team effort, and in this respect every member was indispensable.

Sir Kenneth Anderson expressed the hope that the departmental medallion and its accompanying certificate would become a symbol of that achievement under difficult circumstances. Beyond the contribution of a team, he said, individuals could still contribute significantly to the success of Antarctic expeditions, and outstanding personal service would continue to be recognised by the Polar Medal which the Queen awarded from time to time.

So far the Department of Supply has listed 176 names of men who have wintered at Antarctic stations or bases between 1968 and 1970. The stations are Mawson, Davis, and Casey (formerly Wilkes), and the bases are Repstat and Amery.

* * *

STARLIFTER FLIGHTS

Early next month Starlifters of the United States Military Airlift Command will begin their major role in ferrying men and equipment between Christchurch and McMurdo Sound to support American operations in the Antarctic.

Forty Starlifter flights to the continent are planned between October 12 and January 21. Last summer only one Starlifter took passengers to the Antarctic.

Four Hercules of the United States Navy's VX6E Squadron are expected to spend most of the summer on the continent carrying supplies to the various scientific stations.

This season VXE6 Squadron will use in the Antarctic six new turbine-engined Bell UH-1N helicopters. These are a later development of the UH-1D helicopters introduced to the Antarctic in Deep Freeze 62, and used for topographical survey work by the United States Army.

FOSSIL BLUFF RESCUE

Two sick members of the British Antarctic Survey winter team at Fossil Bluff in George VI Sound, were flown on September 13 to Palmer Station, on Anvers Island, for medical treatment. Blizzards and gales delayed their rescue by an Argentine Navy ski-plane for more than two weeks.

The rescue mission began at the end of last month when Sir Vivian Fuchs, director of the British Antarctic Survey, sent a radio message to the Argentine Antarctic Institute asking for urgent medical help for the two men. One man, Mr Richard Walker, aged 25, had a fractured leg and was suffering from frostbite. The other, Mr Roger O'Donovan, also aged 25, was believed to have hepatitis, and had been unconscious several times.

With a doctor and medical supplies the rescue plane flew first to Palmer Station. Blizzards and 75-mile an hour gales kept it there for several days. It reached the British base on Adelaide Island on September 5, and flew to Fossil Bluff the next day.

Bad weather forced the plane to turn back to Fossil Bluff only a few minutes after it had taken off on the morning of September 8 for Palmer Station 500 miles to the north. The next day the plane was able to make the 250-mile flight to Adelaide Island but the weather was too bad to fly the next stage to Anvers Island.

An unexpected change in the weather, however, allowed the plane to reach Palmer Station after it had been delayed at Adelaide Island for three days. The two men were taken to the medical centre where Mr Walker had the cast on his leg changed, and Mr O'Donovan responded favourably to a diet of fresh food after months of eating only canned food.

On September 16 the Argentine Government announced that the two men would be flown to Buenos Aires for medical treatment.

ANARE NEWS

Mawson Penguin Census

At Davis, a spring journey is planned towards the Grove Nunataks to remeasure the strain-grids established on the ice-cap during 1970. The grids will be extended further along the route, enabling ice movement in the region to be determined.

The party at Casey plans a spring-summer traverse to extend glaciological and geophysical measurements from the bottom of the valley below the local ice-cap to a further 500 kilometres inland.

On Macquarie Island, the staff have continued regular observations for synoptic meteorology, ozone content of the atmosphere, continuous recording of geomagnetic and seismological phenomena, and measurement of tides. There have also been studies of magnetospheric substorms of magnetospheric structure, including ground-satellite correlations.

STATION OFFICERS

The Antarctic Division has announced the selection of officers-in-charge who will serve at the four ANARE stations. They are: Messrs M. E. Roberts, of Black Rock (Victoria), D. A. Gillespie, of Crafers (South Australia), D. J. Lukas, of Lismore (New South Wales), and J. S. McLachlan, of Naracoorte (South Australia).

Five thousand Emperor penguins were counted by the men at Mawson in a census taken at the Taylor and Fold Island rookeries.

A fuel depot trip in the Prince Charles Mountains, particularly at Mt Creswell, is being planned as early as possible in October. This is preparatory to the coming summer programme of combined glaciological and survey activity in this region.

Japan's Antarctic plans for the coming year

A full scientific programme at Syowa Station (69° 00′ S., 39° 35′ W.) and a study of marine biology by the expedition ship Fuji are among the plans for the 13th Japanese Antarctic Research Expedition.

The Fuji will carry 40 members of the 1971-72 expedition, leaving Tokyo on November 25 and proceeding to Syowa Station via Freemantle.

Thirty scientists, base maintenance mechanics and engineers will winter at Syowa under the leadership of Mr Sadao Kawaguchi, and ten men will comprise a summer support party.

The members of the two parties and their jobs or scientific disciplines are:

Winter Party. — Sadao Kawaguchi (leader), Itaru Furizawa, Hiroshi Fukutani, Takehisa Shiratsuchi (meterology), Susumu Isozaki (ionosphere), Norihiko Seto (geophysics), Dr Susumu Kokubun, Shigeru Miyazaki, Yoshikazu Tanaka (upper atmosphere physics), Hiroshi Sasaki (meteorology), Hideki Narita (glaciology), Haruta Murayana (geochemistry), Toshio Miwa (human physiology), Terumi Ishikawa (geology), Masao Inoue (diesel mechanic), Asao Masukawa, Kazunori Umeda (mechanics), Kouichi Sugihara (electrician), Hiroshi Moriguchi, Yasuhiro Kimura (radio operators), Sadasuke Gomi, Seizi Fukusima (cooks), Yoshiro Tamaki (medical doctor), Shigeo Yamazaki (electronics), Norihisa Hiruma (rocket engineer), Akihida Hirayama, Minoru Hohtaki (electronics), Masashi Sano, Fumio Okuhira, Susumu Hayasida (logisticians).

Summer Party.—Zenbei Seino (leader), Tamotsu Bando, Yoshiyuki Iwanaga (physical oceanography), Masao Matsuzaki (marine biology), Kokiti Kimura geodesy), Kiichi Moriwaki (geography), Masahiro Aoyanagi (biology), Kazuo Katagiri, Masaaki Naitow (construction), Kaneo Sato (logistician).

Activities at the base during the December, 1971-November, 1972 period will largely follow the pattern of research disciplines for the previous year. There will be continuous studies of cosmic rays, aurorae and airglow, with rocket flights for auroral observations.

Ionosphere research will be continued and a year-round record of geomagnetism kept. Meteorology in all its many phases will be studied, especially wind speed and direction, air pressure, temperature and humidity, cloud cover, sunshine hours and snow accumulation. Seismology or earthquake observation will be recorded on seismographs throughout the winter.

ROCK AND ICE STUDIES

In the field of geology studies will be made along the coast of Lutzow-Holm Bay with special reference to structural analysis.

Glaciological investigation of the ice sheet will be carried out, with deep core sampling down to 400 metres below the surface. Further work will include the study of valley glaciers of the Soya Coast and observations of the sea-ice in Ongul Strait.

Other activities include the collection of cosmic dust at Syowa Station for the study of cosmic ray-induced nuclides and the continuous measurement of atmosphereic carbon dioxide.

During the summer a living hut for ten men will be erected and a dome-covered rocket launcher.

SHIP'S PROGRAMME

From November, 1971, to April, 1972, the Fuji will carry out a programme of upper atmosphere physics, marine meteorology, and a survey of sea-water gravities between Tokyo and Syowa Station.

Marine biology will include measurement of the chlorophyll content of surface sea water and an ecological study of phyto-plankton and zoo-plankton.

A team of four scientists will also work at Lake Vanda in the dry valley area of Victoria Land. They will carry out shallow drilling and stratigraphical studies and make a hydrological study of lake waters in the area, including plankton population and species.

JARE 12 Journey to Mizuho

A glaciological party will leave Syowa Station at the end of this month for Mizuho, the advance camp about 300 kilometres to the south-east, which was established on July 21 last year at 70deg 42.1min S, 44deg 17.5min E. The party will remain in the field until January

Nine men led by T. Kimura returned to Syowa on July 26 after two weeks at Mizuho where they completed mid-winter supply and construction work. It was the first time that a traverse party has left the station in the middle of the winter.

Mizuho, which is at an altitude of about 2100 metres, was used during a brief period in the summer of 1970-71 by a traverse party from JARE 11. This time the party left Syowa on May 30, pulling a load of about 25 tons with three KC60 and two KC20 vehicles. It arrived on June 28, two weeks behind schedule because of bad weather and low temperatures of minus 40 to 50c.

The party erected a small prefabricated hut and dug a trench for installing generator and glaciological equipment. Last year a corrugated iron warehouse was erected. About five men will be accommodated at Mizuho for glaciological work.

On July 12 the party left Mizuho for Syowa where it arrived on July 26. The men suffered from light frostbite on their faces during the trip but all arrived back in good health. A welcoming party was held concurrently with a delayed mid-winter ceremony.

Twenty-nine men, led by Dr Takasi Oguti, professor of upper atmosphere physics at the University of Tokyo, are all busy at Syowa Station with research projects and preparing for the coming field work during next summer.

One of the main programmes this year was to shoot sounding rockets in the middle of auroral activity during the polar night. But this was not fully accomplished because of unfavourable conditions, high winds, clouds, and relatively weak auroral activity during the quiet period of the sun's activity.

Up to the beginning of August three rocket launchings have been made. Four more rockets will be launched before the end of the year, providing conditions are favourable.

* * *

Soviet Theories on Earth's Crust

Studies by Soviet geologists in Queen Maud Land have revised accepted views on the earth's crust. Rocks of fantastic shapes indicate a huge intermediate layer between the crust and the basalt of the upper mantle.

Professor Mikhail Ravich, of Leningrad, has detected traces of this layer in Charnockite, a mysterious rock which makes up half the mountain ranges of East Antarctic.

This rock, combining features of basalt and graphite, has been found in crystalline formations, but its origin has been a mystery.

Professor Ravich has shown that the rock forms between the crust and the mantle at high temperatures, and under pressures of up to 15,000 atmospheres.

The layer has not been detected before, probably because it is so narrow. Professor Ravich estimates that, on a world-wide scale, the layer is less than six miles thick.

Rocket Observations of Aurora at Syowa

A series of rocket observations of the aurora was started at Syowa Station on June 24 by members of the winter team of the 12th Japanese Antarctic Research Expedition. The first of six S210 rockets was sent aloft at 4.05 a.m. JST, and was guided on a designated path through the aurora.

Part of the observation machinery mounted in the rocket went out of order because of electrical trouble which developed 8.3 seconds after launching. As a result part of the data wanted by the winter team could not be collected. Otherwise the launching was successful.

Japan has launched three S160 rockets, which are one size smaller than the S210 and have a range of 90km, since February 10 last year. The new series of experiments is expected to shed light on the mystery of the aurora phenomenon.

In a report to Tokyo the winter leader, Dr Takasi Oguti, said that the rocket, fired in fair weather, streaked through the aurora's glowing zone at an altitude of 100 to 120 km, and reached a height of 130 km two minutes and 50 seconds later.

Dr Oguti said that the rocket began to spin satisfactorily 47 seconds after it left the launching pad and was separated from its nose cone 61 seconds later. It fell about 100 km south of Syowa Station five minutes and 46 seconds after it was sent aloft.

The rocket is five metres long, 21 centimetres in diameter, and weighs 260 kg.

QUEEN MAUD LAND LAKES

Soviet scientists in the Antarctic have been studying the strange lakes which lie beneath the ice in the mountains of Queen Maud Land. Some of the lakes are 300ft deep, some cover an area of several square miles, and others are 3000ft or more above sea level.

Most of the lakes are formed by the melting of ice in summer; some seem to have been produced by subterranean heat. The ice covering apparently protects them from freezing right to the bottom.

These lakes are rich in diatoms and algae which give the water an unusual bright green colour.

Endeavour is Now Dragon Spring

H.M.N.Z.S. Endeavour, the Royal New Zealand Navy's Antarctic support ship for the last eight years, has changed her name and her navy. She is now the Ron Lung Chan or Dragon Spring, and has been borrowed by the Nationalist Chinese Navy from the United States Navy.

Since she was lent to the Royal New Zealand Navy in October, 1962, the 27-year-old former petrol carrier has been used primarily to carry supplies for Scott Base and fuel for McMurdo Station. She has also been employed on oceanographic research and on supply missions to the remote Pacific Islands administered by New Zealand.

Built as a Patapsco class petrol carrier the Endeavour was originally the U.S.S. Namakagon. She was refitted and strengthened for service in ice, transferred to the Royal New Zealand Navy under the Military Aid Programme and renamed.

Soviet Expedition Will Set Up New Station

Another research station—the seventh—will be established by this season's Soviet expedition to the Antarctic. With a research team of 420, including scientists from Bulgaria, Hungary, the German Democratic Republic, India, Rumania, and the United States, the expedition will be the largest ever sent from the U.S.S.R.

Although the new station has not been identified, it is probably the one which the Russians indicated earlier would be established at Cape Dart, on the coast of Marie Byrd Land. Its location is 73deg 6min S, 126deg 20min W. The establishment of Leningradskaya, on the Oates Coast, about 200 miles from Hallett Station, was announced last season.

This season's expedition will explore and map the area of the Amery Ice Shelf between the Lars Christensen and Ingrid Christensen Coasts. It will travel to Antarctica in four ships, including the veteran Ob. The advance party will leave Leningrad aboard the Ob late in October.

A number of light aircraft will be taken by the expedition, and—for the first time—two large MI-8 helicopters. The helicopters, like those which will be used by the United States Navy's VXE6 Squadron, are turbine-powered.

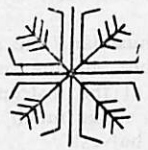
As a transport helicopter the twin-engined MI-8 carries 28 passengers and two pilots. The cargo-carrying version has 24 tip-up seats along the side walls of the cabin, a winch for lifting heavy cargo, clam shell loading doors, and hook on ramps for vehicle loading.

Carrying nearly three tons of cargo the MI-8 has a range of 264 miles. Its service ceiling is 14,700ft, and its normal cruising speed is 140 m.p.h. This is reduced to 112 m.p.h. with a 2½-ton load.

NEW PENGUIN COLONY

Soviet scientists at Bellingshausen Station on King George Island, off the Antarctic Peninsula, reported recently the discovery of a new penguin colony about 10,000 strong. In the same area they found a breeding ground used by sea elephants, fur seals, and sea cows.

A report on the animal world of King George Island, known to the Russians as Waterloo Island, will be published shortly by the Arctic and Antarctic Institute. The whole area, close to the North Foreland promontory, has been declared a reserve.



Winter Research by Soviet Ship

A Soviet research ship, the Academician Knipovich (4000 tons) has sailed from Sebastopol for an eight months' season in the Antarctic. This will be the first Soviet winter exploration in these southern waters.

Scientists aboard the ship hope to discover more shoals of putassu, a type of cod whose liver is particularly rich in oil. They will also continue the search for edible forms of plankton.

The Academician Knipovich was built in the Nikolayev yards on the Black Sea eight years ago. At the request of the United Nations Food and Agriculture Organisation it has also operated as a training ship for young scientists from the developing countries.

SOUTH ON THE WINGS OF THE MORNING

By GERALD S. DOORLY

The first part of Gerald Doorly's memories (see "Antarctic" Vol. 6, No. 2, June, 1971) told of his early sea career. He joined the S.Y. Morning as third officer when she was selected as a relief vessel to the Discovery, the National Antarctic Expedition ship under Captain R. F. Scott which had sailed for the Antarctic in August, 1901. The Morning left London a year later.

* * *

The Bay of Biscay treated us kindly.

Once in the finer weather, we dragged the piano from obscurity to settle it in its new home in the wardroom. To our dismay we found it was too wide to pass through either door leading below to the wardroom.

However, Morrison, the practical-minded chief engineer, solved the problem.

"I'm no musician," he said in finest Glasgow, "but having examined the construction of the instrument, I dinna see it would suffer much detriment by being cut in halves!"

An astonishing and original suggestion. The carpenter, using a cook's meatsaw, hacked through each side of the keyboard and dissected the "instrument". All parts were passed below, neatly secured with glue and a few wooden dowels, and hove tight by a rope and a belaying pin. The keys were reshipped, and a grand concert was held that evening with most of the crew.

We called at Madeira to replenish coal bunkers which had been supplied generously by the Union Castle Company.

Setting off again, we followed the general sailing ship routes and met quite a number of them.

At dawn one morning a large sailing ship appeared out of the blue from the horizon astern, and was up to us soon after noon. We were well into the North East Trades, ambling along at seven knots, while the big four-masted barque was making twice that speed.

She was the Herzogin Sophie Charlotte, from Hamburg, a North German Lloyd training ship, with the cross-keys of the North German Lloyd marked in large black lettering across her main royal.

As she drew abreast of us ensigns were dipped and her German band struck up "God Save the King," followed by a spirited rendering of "Der Wacht am Rhine," and much huzza-ing. The huge four-poster was hull down on the horizon ahead of us at dusk.

We struck a leak when south of the Line, which caused some anxiety. We pumped with both manual and engine-room pumps almost continuously, but the water reached up to 6ft in the hold. At one time the captain considered making for Pernambuco, on the Brazilian coast—our nearest port.

Fortunately the leak lessened and the bilge soundings were gradually reduced to normal. One of the mysterious "deeps" that beset an ancient wooden whaler.

ROUGH WEATHER

Rounding the Cape the little ship wallowed in the Roaring Forties, gale after gale making her "easting down" across the stormy Southern Ocean

One night we broached to. A sudden squall broke over the ship and threw her nearly on to her beam ends.

I fell out of my bunk, shoved my feet

into a pair of slippers and tore up on deck in my pyjamas.

The wind shrieked, lashing the sea into a barrage of hail and spray which drove in sheets up over the lower yards. The lee rail was engulfed. Evans had been caught with the t'gallants set!

I groped aft, clinging to the weather rail, and reached the poop, with Evans's voice, faintly through the fury, shouting, "Give me a hand with the weather t'gallant brace—quick!"

Both t'gallants sails had been let fly, and, with hailstones peppering our backs, we managed to get the main-t'gallant yard pointed sufficiently to spill the wind out of the sail.

The captain dashed up the companion hatch, struggling into fractious oilskins. "In mains'l and upper tops'ls, too!" he ordered.

All hands toiled hard, and by the end of the watch the ship was snugged down.

Drenched and dirty, Evans and I went below to the comfort of clean raiment, the warmth of a hot rum toddy and the bliss of a cosy bunk.

After a spell of three and a half months of eternal sea and sky, the Morning, true to her name, arrived at Lyttelton, New Zealand, at the first streak of a beautiful dawn.

SOUTHWARD HO!

For three weeks we worked at high pressure, relieved by a round of social activities and much kindness which was lavished on us by the good people of New Zealand.

Early in December, 1902, we sailed from Lyttelton, amidst cheering crowds, gay bunting, marine bands and tooting sirens, and set out on our venture into South Polar regions.

Heavily laden, the Morning floundered through stormy seas for three weeks, the weather moderating when she reached the Antarctic Circle in latitude 66° 33′ S. That happened to be Christmas Eve.

We were now in perpetual sunshine, the sun skimming the southern horizon at midnight. The ocean was sprinkled with masses of detached ice, like chunks of icing sugar, floes and jagged bergs making a magical scene.

Christmas Day stands out in my memory. I was awakened by the dull grinding sound of ice crunching along the ship's sides. Hastening on deck, a thrilling sight met my eyes. The oblique rays of the sun cast weird shadows across the fantastic bergs which surrounded us, and reflected superb tints of sapphire and azure through their weather-worn caves.

I dived below to the wardroom and crashed out "Christians Awake, Salute the Happy Morn!" on the piano, which aroused the whole ship's company, who tumbled out of their bunks and we all wished ourselves a Merry Christmas. The wardroom was hung with our gaudy coloured sledge flags, and the imposing array of parcels labelled "Not to be opened till Christmas Day" was pounced on and eagerly investigated.

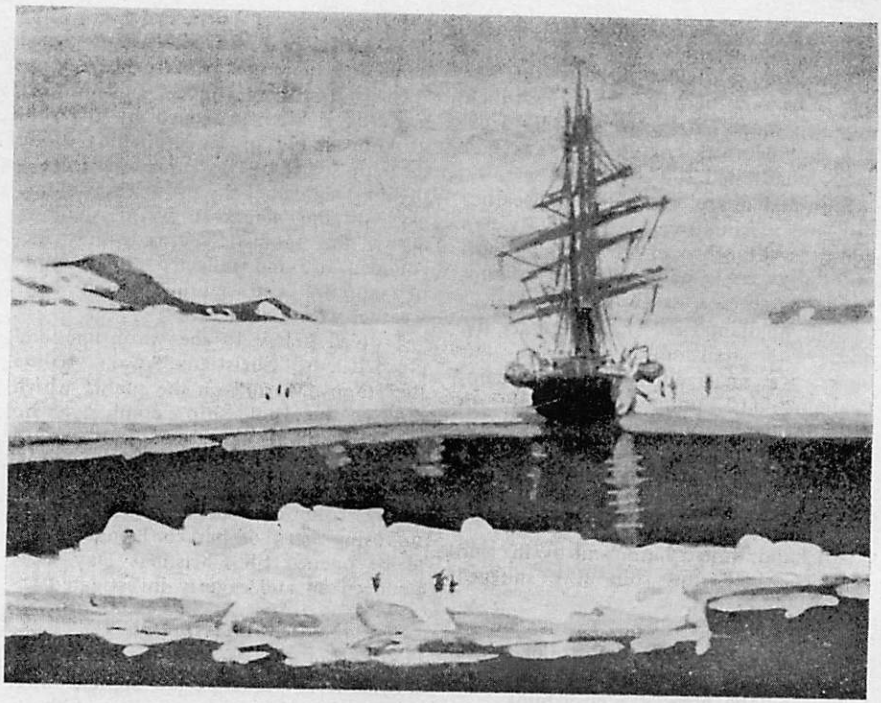
NEW ISLAND FOUND

Steaming for some hours through a labyrinth of icebergs, we sighted what appeared to be a gigantic one with its underside black. The captain pronounced it to be an island. We had made a new discovery, a beautiful uncharted island, on which the eye of man had never before rested! Unhappily, when steaming close to the shore we struck a submerged rocky ledge upon which the ship banged considerably—indeed, part of her false keel broke away before we got free.

A boat party landed the captain on a rocky point, from which he claimed the island for England. Three cheers were exchanged between the shore and ship. We called our discovery Scott Island, and it is situated in latitude 67° 7′ S., longitude 179° 50′ W.

For a week we fought the pack ice, with the ship straining and struggling to smash into and through an apparently impenetrable mass, for 300 miles.

We made the acquaintance of several kinds of seal—crabeaters, Weddells, and an occasional leopard seal; and, of course, the comical Adélie penguins, whom the men dubbed "The Harbour



The Morning in McMurdo Sound

Board" by reason of the quaint manner in which they filed, flipper to flipper, standing on the ice-edge as they watched the ship crunch through the floes.

After battling through the pack, a gale caught us practically at its southern edge, and it increased so violently that we were blown clean out of the pack. Here was a test for us.

The sea rose rapidly and the ship was bumped on to the rolling, spur-projecting dangers. The full force of that south-easterly blizzard threatened to overwhelm us.

Shortly the ocean became a sea of storm-tossed ice derelicts; no canvas could be set owing to the fury of the wind. The engines were going, but they hardly made steerage-way.

It was impossible to avoid collision, and we suffered sickening shocks when great bergs, sobbing and seething as they rolled, with water hissing and belching from their caves, were hurled from the wave's crest against the helpless vessel. Several oak planks were split along the waterline.

Weary and dazed, with eyelids drooping and faces cut by icy blasts, we managed to con our ship safely through an eternity of four awesome days and nights.

"Whatever any of our little crew may say, we were all of us thoroughly frightened," to quote from Admiral Lord Mountevans' book "The Desolate Antarctic".

CONTINENT SIGHTED

The gale abating, we ploughed to the south-west and soon sighted land—the first glimpse of the ice-clad mountain peaks of South Victoria Land.

We reached Cape Adare, the northern extremity of the Admiralty Range, and landed on a pebbly beach occupied by a rookery of screaming penguins, and a

hut built by the Southern Cross party. (See "Antarctic" Vol. 5, No. 11, p. 466.)

Captain Colbeck was as excited as a schoolboy as he ran up the slope to the hut, and broke in the outer porch; more excited still, he found a red-painted cylinder with Discovery marked in white letters—the first clue of our search. (It was dated January, 1902—exactly twelve months before.)

The captain said, "When we left this place four years ago, wild horses couldn't have dragged me here again; and yet . . .!" He showed us where the ten men had bunked, and existed; we hadn't the time to visit Nicolai Hansen's grave, which was at the top of the cape, a thousand feet up.

PUSHING SOUTHWARD

From Robertson Bay we steered towards the south-east along an imposing mountainous coast, dodging in and out between stupendous tabular-shaped bergs.

We searched a penguin rookery on one of the small group of islands—the Possession Islands—but found no record.

Owing to especially heavy pack we were unable to get within 15 to 20 miles of the land. Coulman Island, a large round-backed ice-capped island, lay well to the north of Wood Bay; and Mount Melbourne, a perfect ice-covered cone of 8000ft, was on its southern side. We tried again and again to push in towards this bay, because we had high hope that the Discovery might have wintered there.

We came upon some strange looking ruts across the entire length of a large floe. The marks were similar to those of skis—or a sledge. We were keener than ever to push into the pack towards the land.

However, after careful examination we found these double ruts to be made by penguins, which sometimes propel themselves in this way on their breasts.

Working south we made a determined attempt to force the floes to Franklin Island—a small island well offshore and similar in size and appearance to Scott Island. We had an anxious time struggling through rough floes; but we managed to land on a beach—the inevitable penguin rookery beach.

A blizzard broke upon us suddenly from the south. Steaming our hardest to the eastward, we escaped in the nick of time, into the more open waters of the Ross Sea.

The hardest feature, however, was our failure to secure a record.

Well, we must keep moving. Proceeding due south we picked up the trail at Cape Crozier, in latitude 77° S., then the farthest south point known.

On the slopes of an extinct volcano, Mount Terror (behind which is its bigger sister, Mount Erebus), in the midst of a huge penguin rookery, we found a wooden post with three red-painted cylinders marked Discovery lashed on to it.

With much excitement we read the contents, and knew that the Discovery was only about 90 miles from us—in McMurdo Sound!

Hastening on board, we got under way with a full head of steam and steered to the westward along the Erebus shore.

We were soon held up, unfortunately, by the heaviest pack we had encountered, and it took a week's strenuous slugging before we broke through into a narrow channel between Cape Bird and Beaufort Island.

We were then free enough to steam all out to the south up McMurdo Sound, and at midnight precisely, we sighted the trucks of two of the Discovery's masts over a ridge of land. They looked for all the world like a couple of tiny matches in the middle of that desolate wilderness of ice and snow.

THE DISCOVERY

Ten blizzard-blown explorers, including Armitage, second-in-command, and Skelton, the Discovery's chief engineer, welcomed us after they had sledged across ten miles of bay ice to the Morning.

Armitage had recently returned from

his pioneer sledge journey up the western mountains of McMurdo Sound, accompanied by Skelton (later Engineer-Admiral Sir Reginald Skelton).

They spent a few days with us in the Morning, lapping up the news of the outside world, and telling in turn of many exciting happenings in the south. They were particularly interested and happy when I dug out their packages of mail from the mail locker.

The Discovery was frozen in her winter harbour at the foot of the majestic volcano Mount Erebus, over 12,000 feet above the sea.

A hut had been built on the north point of the bay, Hut Point, as a refuge should mishap befall the ship. It was flanked inside with stores, mostly boxes of biscuits. The vacant space within was used for occasional theatrical shows during the winter. These entertainments went over well, the audience applauding every number, vigorously clapping hands and stamping feet—they would have been frozen stiff otherwise in that devitalising icebox. The barn was called "The Royal Terror Theatre".

SOUTHERN PARTY RETURNS

A week after the arrival of the Morning in the Sound, Captain Scott, Lieutenant Shackleton (R.N.R.) and Dr Wilson returned from the pioneer southern sledge journey over the Great Ice Barrier, having reached latitude 80° 17′ South. They suffered much from scurvy, and all their dogs perished.

A "banquet" marked the fine feat, but after weeks of scanty sledge rations the blow-out of New Zealand mutton, potatoes and plum duff put too severe a strain on their digestive organs and they were promptly sick; but they couldn't stop eating. They said it was "heavenly" being at home again, and continued devouring both food and their big mail.

The relief ship had brought them all good news, and Captain Scott said, in a short speech after dinner, that it was a blessing aptly to quote "Joy cometh in the Morning".

Scott was restless. Frequently he ducked into the pantry to have another go at the remains of the meal. About 2 a.m. I heard him rousing Shackleton, whose cabin was next to the one I was in.

"I say, Shackles," he called, "How would you fancy some sardines on toast?"

The smell of toasting bread at the wardroom fire was overpowering, and Scott spent the early hours stoking up his inside and those of his two ravenous companions. This pathetic gorging continued for several days.

The magnetic observer of the expedition, Armitage "swung" the Morning one day for compass adjustment. Our ship being built of wood, there was little to divert our compass needles from the path of rectitude; the earth's magnetism, however, upset them sufficiently to compel us to steer in the direction of north-east when we really wanted to head for the South Pole.

During "swinging" operations killer whales frequently shot from under the ship, cascading vapoury jets from their blowholes when they surfaced. As they usually rose to windward, we often received forceful squirts in our faces.

The killer's dorsal fin is like a high three-cornered jibsail which lists over heavily when the whale's back surfaces in a strong beam wind. We did not know then how treacherous and vicious killer whales are. Captain Scott found this out, to his cost, in his last expedition, several years later.

Captain Scott had named the southern point of the winter harbour Cape Armitage. "A graceful tribute," said Armitage, "and the more appreciated because my name was thereby associated with those of Ross's two senior officers, Captain Crozier and Lieutenant Bird."

(Rising abruptly from Cape Armitage there now stands, on its summit, Observation Hill, a huge jarrah wood cross overlooking the Ross Ice Shelf—the memorial to Scott and his four companions who perished when returning from the South Pole ten years later.)

SUB-ANTARCTIC

Life on Campbell Island

DEREK LAWS REPORTS:

Ten months of our year on Campbell Island have now passed and this will be my last report for "Antarctic".

For the eight people out of the nine who came here, wintering has been an experience they will long remember.

Two of the meteorological staff had been to Raoul Island but only our cook, Bryan George, who stayed over from last year, knew exactly what it was like to spend a winter on Campbell Island.

On the whole the weather over the past ten months has been fairly kind to us, and compared to the period October to July in previous years some interesting comparisons emerge.

The total rainfall for this period was slightly above average, there being 12 large landslides during February after 1.3 inches of rain fell in three hours. It would appear that no landslides of this magnitude have occurred for many years.

The temperature for the period has been above average 0.4 degrees Celsius. The winter months have been warmer by a good one degree Celsius up to the present, with an absence of any heavy falls of snow although there is still time for this to happen.

Sunshine has been less than normal and we have had only about two-thirds of our fair share though the period March to July reveals a total of 13½ hours above normal. The rest of the year showed a drop of 186 hours.

One feature this year has been that there are three very active ham radio operators. They have flashed their call signs ZL4JF/A, ZL4JL/A, ZL4OK/A, both by voice and morse. Between them they have contacted most countries in the world and other ham radio operators are keen to contact Campbell Island, as in the international code it is listed as a separate country.

We had our second air drop by R.N.Z.A.F. Orion on June 29 and in almost perfect conditions they parachuted the five containers plus seven free drop containers. The main feature of this airdrop was the pinpoint accuracy, and all units landed within a 50-yard radius of the helicopter pad. The whole drop took only about 40 minutes and within ten minutes of the aircraft's departure the weather had closed in so we consider ourselves extremely lucky to get our mail and supplies.

During the winter months a building similar to the Sorenson Hut at Bull Rock has been built at North West Bay. The hut is sited just up from Beach Bay which is one of the smaller inlets of North West Bay. The design and all of the work were carried out by Neville Brown and Lindsay Barker with assistance from other members of the expedition from time to time. Some of the awkward loads that were tied to pack frames and carted across there had to be seen to be believed. The first course of the journey is up the fence line and with a heavy load that is quite a haul. From then on the journey was fairly easy except for the climb out of Windlass Bay.

Work is still progressing on the hut with such refinements as a water supply and a front patio. It is a very cosy retreat to get away from it all.

Socially our last big event was the mid-winter celebration of June 21 and 22. The dinner commenced on the 21st and was yet another masterpiece of the culinary art on the part of our cook.

The courses were many and varied and toasts were drunk to our companions on expeditions in other remote places and friends and organisations who celebrate mid-winter's day.

On June 22 six of the party took to the water and enjoyed a mid-winter swim. Their remarks were that the water was not all that cold. A pre-recorded tape was made and sent to 4ZA Invercargill and our request for a programme especially for Campbell Island was broadcast on the morning of June 21.

The usual recreational activities of tramping, bird banding and photography have been popular during the winter months. Several bird banding trips have been made to the Mowbray area and over the top of Mt. Honey and several more are planned before the end of September.

Progress has been made with items of the works programme. The main task was the complete re-laying of the Marsden matting road down the hill from the top intersection to just past the power house. Also a sleeper road from the wharf to the powerhouse was lifted and relaid from the area Marsden matting to the reef. With some used drains dug in the vicinity of this road the whole area dries out better and is considered a vast improvement.

Many other jobs have been completed and July was an exceptionally busy month. There is much activity at present with the annual overhaul of the station boat and with luck this should be finished by the end of August, leaving September fairly clear to tidy up the camp area and prepare for servicing in October.

Of the two chess matches with Scott Base started in May one has ended with a victory for the boys down south and the other game is still in progress. It is quite nicely poised and we are hoping to win the series.

With next year's expedition members now appointed time is steadily running out for the 1970-71 expedition. The leader for Campbell Island for 1971-72 is Vince Sussmilch who has already experienced a year here as senior meteorological observer in 1967-68. I extend to Vince all the best for his tour of duty. At present it appears as though he will not be as fortunate as we were with ships calling and bringing visitors, but something may turn up. The Royal New Zealand Navy no longer has the Endeavour, the ship that has called many times at Campbell Island with three visits this year.

Most of us now look forward to our return to New Zealand. Neville Brown and Keith Herick will be staying on for the summer period and they will be joined on the meteorological staff by Mark Crompton who left here last March.

Best wishes for a very successful tour of duty to the 1971-72 expedition to Campbell Island.

AWARD TO SANAE LEADER

The BP Antarctica Gold Medal for 1971 has been awarded to Mr Henry Fulton, of Pretoria, who has spent more than three years in the Antarctic. Mr Fulton was leader of Sanae 10 in 1969.

The South African Antarctic Association has announced that the medal has been awarded to Mr Fulton for the qualities of leadership he displayed on the three expeditions in which he took part.

Mr Fulton was appointed junior diesel mechanic with Sanae 3 in 1962. He returned in 1966 as senior diesel mechanic and deputy leader of the Sanae team, and was appointed leader in 1969, spending another 12 months in the Antarctic.

The Antarctic Association has praised highly the way in which Mr Fulton and three members of his team explored the hazardous and unmapped terrain where they eventually established Borga Base.

Shackleton's bible returns home after many years

Fifty-six years ago Sir Ernest Shackleton threw away a Bible on the ice of the Weddell Sea. A handful of golden sovereigns and a gold watch and chain preceded the Bible.

The date was October 30, 1915. Three days earlier Shackleton and his men had abandoned their ship, the Endurance, which was slowly being crushed to death in the grinding pack ice. On October 30 they began their march with the ship's three boats across the ice in an attempt to reach Paulet Island and safety 346 miles away.

Before the party left Dump Camp Shackleton gave the order that personal gear must not exceed 2lb a man. This meant that nothing but bare necessities could be taken on the march. Shackleton set the example by throwing away the Bible, the sovereigns, and his watch.

In his book "South" Shackleton writes: "I tore the fly leaf out of the Bible which Queen Alexandra had given to the ship, with her own writing on it, and also the wonderful page of Job containing the verse:

Out of whose womb came the ice?
And the hoary frost of Heaven, who hath gendered it?
The waters are hid as with a stone
And the face of the deep is frozen.

"The other Bible, which Queen Alexandra had given for the use of the shore party perished when the ship received her death-blow."

Shackleton's biographers, Margery and James Fisher, say that he removed from the Bible the inscribed fly leaf, two pages from the Book of Job with verses particularly appropriate to men alone in an ice-bound land, and the page containing his favourite 23rd Psalm.

Somehow the pages from the Bible survived the incredible journey to Elepant Island and the voyage to South Georgia. They are still treasured in his family.

What Shackleton never learned up to the time of his death was that the Bible was not left behind on the ice. It was retrieved by a member of the expedition, Thomas F. McLeod, who was a fireman aboard the Endurance. He retained it throughout his privations in the boat and on Elephant Island.

Early this year Commander M. K. Burley, leader of the 1970-71 Joint Services Expedition to Elephant Island, gave a talk at the British Embassy in Buenos Aires about the Joint Services Expedition to South Georgia, which he led in 1964-65.

After the talk Commander Burley was given a Bible by Miss I. MacLean. It was the Bible from the Endurance.

In the expedition report Commander Burley says that after Shackleton's men had been rescued from Elephant Island and brought to Punta Arenas by the Chilean ship Yelcho, McLeod presented the Bible to Miss MacLean's parents, with whom he had stayed, in appreciation of their hospitality.

Commander Burley took the Bible to Elephant Island again, and says that it will be given to the Royal Geographical Society for safekeeping.

McLeod probably believed that Shackleton was courting bad luck by throwing away a Bible.

He seems to have been pessimistic about the expedition's chances of survival. On October 26 a little knot of eight Emperor penguins stood near the ship singing what sounded like a dirge for her. McLeod remarked, "do you hear that, we'll none of us get back to our homes again."

Ten-year International Ice Study Programme

A ten-year concentrated programme of collaborative glaciological studies of a sizable part of the East Antarctic ice sheet is planned by scientists from France, the United States, the Soviet Union, and Australia. The first stage of the International Antarctic Glaciological Project, which begins this summer, will include two traverses.

For the international project the French have planned a joint traverse with the Russians, and the setting up of a station on the Polar Plateau in Wilkes Land.

The French will set out on the 1000-mile traverse from their Dumont d'Urville Station on the Adelie Coast, across Wilkes Land towards Russia's Vostok Station, the Russians working from their station towards the French party.

A 900-mile traverse will be made by men of the Australian National Antarctic Research Expedition. It will follow a route from Casey Station, on the Budd Station, to Vostok Station. In effect the party will be retracing the route of the 1961-63 party from Wilkes Station (now Casey) led by Mr R. B. Thomson, now superintendent of the Antarctic Division of the New Zealand Department of Scientific and Industrial Research.

Australian glaciological programmes already exist in the international project area, which is within Longitudes 60deg and 160deg East, and Latitude 80deg South. They have been remodelled to match the international project proposals.

In addition to radio ice thickness sounding flights by a ski-equipped Navy Hercules, the United States will provide logistic support for the ground parties sent out from Dumont d'Urville Station.

A Navy Herucles will transport between 10 and 20 scientists from Christchurch to McMurdo Station, and then to the small French station, Carrefour, where nearly three and a half tons of cargo will be unloaded. Carrefour was established by the French last season on the icecap about 25 miles south-west of Dumont d'Urville Station at an altitude of 900 metres.

As well as landing scientists and cargo at Carrefour, the United States Naval Support Force will establish a series of fuel depots along the ice-flow line between Dumont d'Urville and Vostok Stations.

Four phases are envisioned in the International Antarctic Glaciological Project. The first two are: (1) Systematic aerial surveys of ice thickness and base rock topography, including runs along proposed traverse routes and theoretical studies of ice flow; (2) traverses undertaking velocity and strain surveys with a series of shallow drill holes continuing theoretical development of the first phase, and including feasibility studies of new techniques for core drilling in cold ice.

In the third phases there will be traverses perpendicular to the main flow lines, and attempts with deep drilling in the vicinity of the ice divide. Data from the first two phases will be used to determine the sites of additional deep drill holes. The final phase will be re-measurement of the strain lines in 1976 with additional theoretical work resulting from analysis of the data from phases two and three.

A Flying Tiger Line pilot, Mr E. Long, plans to fly a Piper Navajo over the South and North Poles. Late in November he is expected to make an 18-hour flight from Punta Arenas, Chile, to McMurdo Station.

ANTARCTIC BOOKSHELF

DON WHILLANS — PORTRAIT OF A MOUNTAINEER

By Don Whillans and Alick Ormerod

IX + 266 pp. ill., index. Wm. Heinemann Ltd., London, 1971.

This is certainly a portrait of a mountaineer! A portrait of one of the greatest mountaineers to come out of post-war England, and indeed of one of the top six climbers in the world today—for Don Whillans is certainly all of these. And so with keen anticipation I scanned the pages of the life story of this remarkable young climber.

Whillans' restless character is soon portrayed in incidents of his early school days in the rather tough suburbs of Manchester, where at the age of 14 years the yearning to roam and explore had already taken him on long week-end treks among the Derbyshire moors: ". . . I thought nothing of 30 miles a day when I'd been at it a bit."—and this from a 14-year-old schoolboy! A year or so later, while out on one of these solitary hikes, Whillans met and teamed up with another kindred spirit by the name of Worthington, and in the course of their regular excursions they would sometimes stand amused and "watch foolhardy young men clinging for dear life on the gritstone outcrops." Until one day Worthington suddenly said, "Hey, why don't we have a go?"

So they purchased a rope (but only because this seemed the thing to do!) and set off to the foot of a rock outcrop up which Whillans gazed in awe: ". . . I wonder if anybody climbs up here. It looks a bit frightening."

And with these few words they proceeded on their first climb, and found after their success that the route up was graded 'Severe'; which was quite meaningless to them but which, twenty years ago in Britain, indicated a reasonably high standard of climbing. A few weeks later they were back again, this time Whillans leading a 'Very Severe' route on Phoenix. Remember he was barely 17 years old; he had never received any climbing instruction; nor had he been able to benefit by climbing with a guide or an experienced partner. I mention this so that the lay reader will better appreciate the masterly understatement of Whillans' 13-word description of the climb.

After this audacious beginning he teamed up with various experienced snow and ice climbers, and broadened his experience on more alpine-type climbs. It was a year later, 1951, that a chance meeting heralded the first great partnership that was to mark Whillans' climbing career. He was out on one of those legendary Sunday strolls when he saw quite a group of people watching some hair-rasing climbing on a 70ft overhanging rock face. He watched with intense interest as the lead climber gave a masterly display, but when the second man attempted to follow, it proved beyond his capacity and he gave up. Suddenly Whillans could contain his eagerness no longer, so he yelled up to the cliff top:

"Hey, can I have a go?"

"Aye, if you like," came back the reply.

So with great gusto Whillans attacked the face, to be met on top by a young man who had . . . "a mouth packed with big white teeth, and he grinned a hell of a lot." None other than Joe Brown—a young British climber who was then so far ahead of his contemporaries in advanced rock climbing techniques that he literally had no one to partner him. This historic meeting was later to form a climbing partnership the likes of which England had never seen; and over a period of several glorious years the Whillans-Brown stamp was to be indelibly marked on all the greatest climbs in

England, Wales, Scotland and throughout the European Alps.

The second great partnership started in another casual sort of a way when, in 1958, Whillans and a companion set out to try the famous (or infamous) "Bonatti Pillar", and it so happened that an Austrian pair and another English pair (one of whom was named Chris Bonington) were also waiting to attempt this great climb. The six finally succeeded in the second ascent of this route, but only after some pretty anxious and hectic moments; but out of this climb merged an affinity with Bonington that was to lead to even greater heights than previously. Whillans writes: ". . . we were an ill-assorted pair but we balanced each other—his impetuosity, my stolidness; his volubility, my terseness. On a climb we made a sound partnership, and I enjoyed climbing with him immensely."

In the book we are able, albeit sometimes very briefly, to re-live the tremendous achievements of this climber over the 20-year period which it covers —the "apprenticeship" on the rocks of Wales and Scotland; the great face climbs in Europe; the four expeditions to the Himalayas (now five); two expeditions to the Patagonian Andes at the extremity of South America; one to the central Andes of Peru; and an amusing interlude with climbs in the Yosemite Valley, where the crack British climber was really tested by his American climbing "friends". And of all the many epic stories in this book. I thought Chapter 18 dealing with the ascent of the South Pillar of the Marmolata di Penia in the Italian Alps was the best of them all.

This climb, under the appalling conditions encountered, must have been long remembered by the tough and seasoned Whillans—certain it is that he writes with a more expansive manner than in previous chapters, and the result is a gripping account. You vividly re-live the inch by inch perilous ascent of this veritable wall of ice-plastered rock, on which Whillans and his companion more than once looked certain death very closely in the eye. I thought it a great pity that more of this open, unabashed style could not have been maintained—but then mountaineers of Whillans' calibre are notorious for their modesty.

To read this book is to read of the great flowering of British mountaineering techniques and achievements, which have probably advanced further in the past 20 years than in the previous entire century—and the man in the forefront of this revolutionary development was undoubtedly Whillans. The book suffers a little, as it reflects that common characteristic of outstanding Englishmen in whatever their field of endeavour, that of being just a little too modest and a little too conservative—and one or two maps would not have gone amiss. But these are small criticisms indeed. Brian Hearfield.

* * *

NEW WILSON BOOK

In 1972, the centenary of Edward Wilson's birth, the Blandford Press will issue his diary of his final project, the Terra Nova expedition led by Captain Scott to the South Pole in 1910-11. This important publication follows the international success of Wilson's "Diary of the Discovery Expedition to the Antarctic Regions 1901-4" and his "Birds of the Antarctic."

"Journal of Scott's Last Expedition" will include 24 pages of Edward Wilson's remarkable water colour paintings—most of them never before published—and many of his pencil sketches as well as photographs, documents and extensive maps.

The text has been edited by H. G. R. King, the librarian and information officer of the Scott Polar Research Institute in Cambridge, and will include pages of the original journal in facsimile, among them the poignant and courageous last letter written by Wilson, which was found in the tent opposite his body.

The price of the book will be approximately £5 English currency.

"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.

Subscription for non-members of the Antarctic Society, NZ$3. Overseas NZ$3.50, includes postage (air mail postage extra). Details of back issues available may be obtained from the Secretary, New Zealand Antarctic Society, P.O. Box 1223, Christchurch, New Zealand.

The New Zealand Antarctic Society

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 membership fee is NZ$2.00 (or equivalent local currency). Subscription to "Antarctic" is a further $2.50.

New Zealand Secretary

Miss J. Garraway, P.O. Box 1223, Christchurch.

Branch Secretaries

Canterbury: Mrs E. F. Cross, P.O. Box 404, Christchurch.
Wellington: Mr F. O'Leary, P.O. Box 2110, Wellington.

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