

ANTARCTIC

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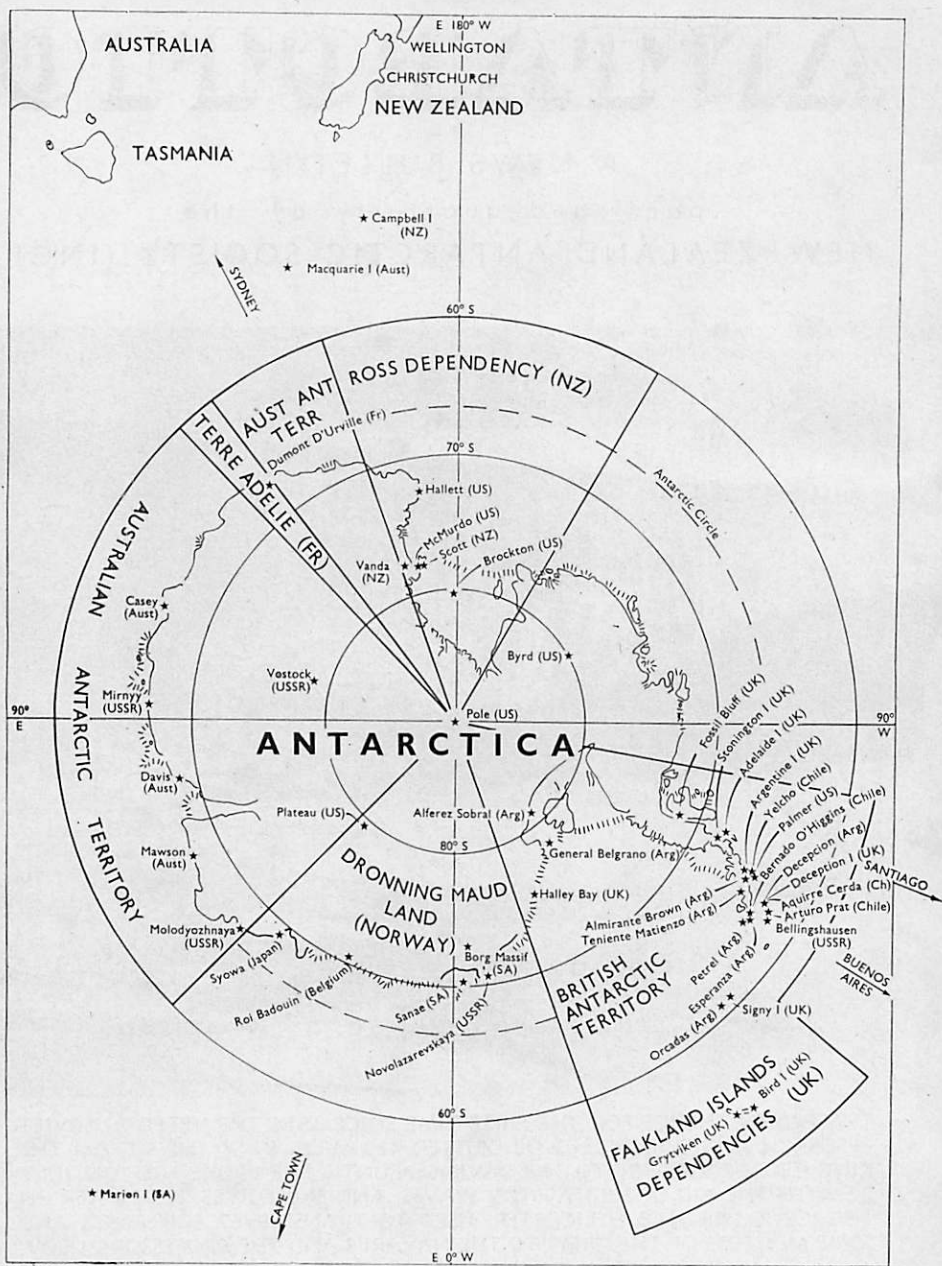
TRAPPED IN THE ICE FOR THE FIRST TIME SINCE 1956 THE VETERAN SOVIET RESEARCH AND SUPPLY SHIP OB DRIFTED 450 MILES IN 90 DAYS FROM THE KING GEORGE V COAST TO THE DAVIS SEA UNTIL SHE BROKE FREE ON JULY 22 WITH THE AID OF HIGH WINDS, WAVES, AND EXPLOSIVES. BESIDE HER ON THE ICE IS HER MI-8 HELICOPTER, USED TO TRANSFER 67 SCIENTISTS AND SOME MEMBERS OF THE CREW TO THE NAVARIN AND THE PROFESSOR ZUBOV.

— Novosti Photo

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This issue of "Antarctic" is the last to be produced under the direction of Mr H. F. Griffiths, who has retired after more than three years as editor. The production of a publication recognised internationally as an authoritative guide to the field activities of all nations engaged in Antarctica is a demanding task; Harold Griffiths has brought to it energy, enthusiasm, and understanding.

"Antarctic" is more than a guide to Antarctic field work. For many years it has published articles of scientific and historic interest, book reviews, and reports which have faithfully recorded change and development on the continent since the Heroic Age of exploration.

A long association with Antarctic affairs and the expeditions of the past 40 years has enabled Harold Griffiths to maintain the high standards set by the first editor, Leslie Quartermain, and to expand and maintain the bulletin's accurate and authoritative coverage of Antarctic events.

All concerned with Antarctica in and beyond New Zealand owe much to Harold Griffiths for his dedicated interest in "Antarctic". The New Zealand Antarctic Society, which publishes the bulletin, is also indebted to him, not only for his editorship but also for his devotion to its interests as founder of two branches—Dunedin and Canterbury—and as a past president.

N.Z. PROGRAMME MAINLY IN DRY VALLEYS

New Zealand's Antarctic research programme for 1973-74 will include full responsibility for all drilling operations needed in the Dry Valley Drilling Project—a major three-year programme developed by United States, New Zealand, and Japanese scientists. Last summer New Zealand drillers on Ross Island were part of a team drawn from the participating countries, but responsible to the National Science Foundation.

This season the New Zealand team is attempting to drill the deepest hole in Antarctic rock—to a depth of 3000ft—at a site near the earth sciences laboratory at the foot of Observation Hill, McMurdo Station. To test the drill rig the bore hole which reached 558ft last season has been re-drilled to 435ft. Thermo-couplings have been installed to take heat layer measurements through the summer.

Later the drill rig will be transferred across McMurdo Sound to the Wright Valley. There a hole will be drilled in the floor of Lake Vanda, near New Zealand's Vanda Station. Drilling sites will then be established on or near Lake Vida, Don Juan Pond, Lake Bonney, Lake Fryxell, and on the shoreline of New Harbour. Seven holes, each 1980ft deep, will be drilled by the end of next February.

New Zealand and Japanese scientists will participate in the first phase of the project. Dr S. B. Treves, of the University of Nebraska, who is the project scientist, says the main purpose of the three-year programme is to obtain a geological history of the continent, covering the last 100 million years.

About 117 men and three women will be involved in various aspects of scientific research this season. Much of the scientific work will be done in the dry valleys where the New Zealanders will co-operate with Italian and Russian scientists. An unusual experiment will be conducted by the Antarctic Division of the Department of Scientific and Industrial Research. It will attempt to harness thermal power from the water of McMurdo Sound beneath the pressure ridges in front of Scott Base.

Winter Teams at Bases

Fourteen men have been selected to winter at Scott Base and Vanda Station in 1974. Another man from the summer support staff will join the Scott Base team at the end of the season. Vanda Station will have a winter team of four for the first time since 1970.

The leader at Scott Base is Mr H. W. E. Jones, a former New Zealand Army officer. Vanda Station's leader is an Englishman, Mr I. Curphey, who has worked with the British Antarctic Survey.

Members of the winter parties are:

SCOTT BASE

Harry Jones (47), Auckland (see "Antarctic," June, 1973, Page 340).

William Johnson (45), Lancashire, England. Base engineer. He is workshop manager at Burnham Military Camp, Christchurch.

Robert Grant (25), Invercargill. Fitter mechanic. He is an automotive diesel mechanic at Twizel.

Chris Wilkins (23), Tauranga. Electrician. Formerly an electrician with an Auckland firm.

Raymond Colliver (40), Auckland. Cook. An Englishman, he has had much cooking and catering experience, and had his own cake shop in Auckland for many years.

Garth Cowan (22), Palmerston North. Technician. Does the same job in the Royal New Zealand Air Force.

Anthony Smith (26), Wellington. Technician. A technical trainee in the chemical engineering section of the Department of Scientific and Industrial Research.

Stuart Clarke (23), Te Kuiti. Technician. Formerly with the Institute of Nuclear Sciences, Lower Hutt.

Robert Gibson (25), Chatham Islands. Postmaster. He has served two terms as a radio operator at the Chatham Islands.

John Warriner (23), Te Kuiti. Post Office technician. Does the same job in the Post Office.

VANDA STATION

Ian Curphey (31), Greymouth. Leader. He is a draughtsman, an experienced mountaineer, and has had extensive experience at British Antarctic Survey bases.

Antony Atkinson (26), Christchurch. Senior technical officer. He is an electronics technician.

Peter Thompson (24), Dunedin. Technician. He has had considerable electronic engineering experience overseas.

Tony Bromley (28), Wellington. Meteorological observer. Works for the research section of the Meteorological Service in Wellington.

ON TOP OF THE POLE

In about five years the main building of the new Amundsen-Scott South Pole Station is likely to be directly on the geographic South Pole. The station is being built about 400yds from the actual Pole, but the constant drifting of the ice cap beneath it is expected to put it exactly at the bottom of the world.

Italians to work in dry valleys

Five Italians will spend six weeks in the dry valleys this summer in an attempt to relate certain conditions found there to those in tropical deserts. Led by Professor A. G. Segre, the team of three scientists and two technicians, will study the glacial morphology, petrography, geochemistry, and micro-meteorology of the valleys.

Four of the five, including Professor Segre, have been in the Antarctic before. They were with the New Zealanders during the 1968-69 summer. The party, which represents the Italian National Committee of Scientific Research, will be self-supporting except for transport by New Zealand.



OPOSSUM FUR FOR PARKAS

New Zealand opossum fur will replace Canadian wolverine fur on parkas worn by members of the New Zealand Antarctic research team this season. Although not as good as wolverine fur the opossum fur was tested on two parkas last summer and found to be a suitable substitute.

Previously the Antarctic Division, D.S.I.R., has imported wolverine fur from Canada at a cost of \$15 a foot. It has now received its first consignment of 100 opossum pelts. They cost \$2.85 each, and it is estimated that 4ft of fur strips can be obtained from one pelt.

Field Projects for Summer

Scientists from five universities, the Ministry of Works, Geological Survey, and the Oceanographic Institute, will take part in the summer activities of the 1973-74 research programme. They will work at or from Scott Base, Vanda Station, and Cape Bird, in South Victoria Land, and the Shapeless Mountain area of the Boomerang Range, about 150 miles from Scott Base.

There will be 57 men and three women in the summer support staff. Mrs Janet Crump will be the scientific leader of the Victoria University of Wellington expedition, and another member, Mrs Rosemary Kyle, will also be going south for the second time. Miss Joy Woods will work as a technical assistant with the University of Canterbury party at Cape Bird.

This season five Italian scientists will work in the dry valleys for several weeks. Three Russian scientists are expected to join in New Zealand activities in the same area and will also visit the South Pole Station.

SCOTT BASE

Shaun M. Norman. Deputy leader. Christchurch. An Englishman who has been with the British Antarctic Survey as a base commander, meteorologist, and general assistant. He held the same position in the 1972-73 season.

Gordon Nation. Storekeeper. Christchurch.

Brian Fischer. Carpenter. Dannevirke.

William Whitely. Assistant maintenance officer. Dunedin.

Robert Newland. Assistant maintenance officer. Wellington.

Frederick Szydlík. Information officer. Wellington.

Robert Chambers. Assistant postmaster. Chatham Islands.

Peter Ramsden. Technical trainee. Wellington.

FIELD PROJECTS

Ministry of Works. Hydrology and glaciology, Vanda Station region.

Graham Boddy, leader and hydrologist, John Fenwick and Peter Anderton, hydrologists, G. Horrell, assistant hydrologist, John Rothery, surveyor.

Geological Survey. Geochemistry in Koettlitz Glacier region. Peter Blattner, leader, Michael Chapman-Smith and David Feary, geologists, Max Tunnicliffe, field assistant. Dry Valley dykes: Jim Lowery, leader, Howard Dengate, field assistant.

Oceanographic Institute. Current studies and hydrological measurements in McMurdo Sound. Ron Heath, oceanographer.

Victoria University of Wellington. Dry valleys geology. Mrs Janet Crump, scientific leader, Ken Blackwood, field leader, Mrs Rosemary Kyle, J. McPherson, John Keys, Russell Plume, Graham Rowe, geologists. Dry valleys geochemistry. Philip Kyle, leader, Paul Luckman, geologist.

Waikato University. Dry valleys biology and sedimentology. Dr Alex Wilson, leader, Dr T. Healy, Dr Chris Hendry, R. Holdsworth, scientists, J. Gumbley, A. Field, C. Reynolds, students.

Auckland University. Blowing dust profile, Vanda Station. Frank Blair, leader, Steven Warder and Gerald Straka, technical assistants.

Otago University. Zoology of Weddell seals. Warren Fatherston, leader. Canterbury University. Penguin and skua studies, Cape Bird. P. Sagar, leader, Miss Joy Woods, J. Early, C. Paulin, technical assistants. Weddell seal census, I. Clement.

Dry Valley International Drilling Project. Jack Hoffman, drilling supervisor, Leon Oliver, George Murphy, Bain Webster, Jim Gupwell (foreman drillers), J. Starr, Peter Fowler, Max Williams, Allan Oliver, Brent Calder (drillers), Ian Nelson, assistant maintenance officer, Michael King, field assistant.

Thermal Power Experiment in Antarctic Waters

Thermal power from the waters of the Antarctic may become a reality if an experiment planned by the Antarctic Division of the Department of Scientific and Industrial Research is successful. The experiment in the waters of McMurdo Sound 35ft deep beneath the pressure ridges of Scott Base will be designed to generate power by using the warm surface temperature of the water with the colder temperature of the lower region.

Mr R. B. Thomson, director of the Antarctic Division, says that the "negative pelagic thermal power" project was first suggested as a possible way to provide power and heat in the Antarctic by a British scientist, Mr Francis de Latour, who retired to live in New Zealand and died this year. His knowledge of thermo-dynamics convinced him that this idea was the easiest and cheapest method of obtaining thermal power. He was obsessed with the potentialities of the idea for more than 50 years but never succeeded in attracting commercial interest.

Mr Thomson says that for the best possible results in the experiment there should be a reasonable temperature differential between the surface and sub-surface temperatures. There is a greater difference in the temperatures of the water in McMurdo Sound than in most other parts of the world.

Studies of Mr de Latour's proposals have been made by Mr H. W. E. Jones, the leader at Scott Base for 1973-74, who is a mechanical engineer. He will construct the prototype model for the experiment and install it near Scott Base.

Not much equipment is needed for the experiment. A considerable length of rubber hose filled with carbon dioxide gas will be looped at the top and bottom of the water. Because of the differences in temperature the gas will circulate, and at one stage will pass through the rotors of a turbine, which, in turn, will drive an alternator to produce the power.

Theoretically the experiment should work, according to Mr Thomson. If it is successful the model would be capable of generating a maximum of 360 watts

of electric power. Provided the experiment is reasonably successful, the Antarctic Division might progress to using a one-kilowatt unit which could provide the power needed to run the small research laboratory at Cape Bird.

Saucer from Byrd Ship's Crockery

Ship's crockery from Rear-Admiral E. Byrd's 1933-35 expedition seems to have found its way into the homes of Dunedin residents as "unofficial" gifts from members of the crews of the Bear of Oakland and the Jacob Ruppert. Early this year the Canterbury Museum received a meat plate from the Bear of Oakland for its Antarctic collection. It was presented to the donor's mother by members of the crew.

Now a porcelain saucer overprinted with a transfer of the expedition's aircraft has been given to the museum by Mrs M. Nunn. It was acquired by her family in Dunedin, and was made by the same china company which made the meat plate. But there is some confusion about the name of the firm. In one report it is described as the Franfalter China Company, Zanesville, Ohio; in another it is called the Traumfelter China Company.

Another gift to the museum last month was a sample of kelyte from Mt Erebus, Ross Island. It was taken in March, 1911, and sent from Cape Evans by Captain Scott to Mr J. J. Kinsey. Mr Kinsey, later Sir Joseph, was Scott's business representative in Christchurch for both expeditions. The kelyte was given to the museum by Mrs I. Watson.

BRITISH SURVEY NEWS

Sir Vivian Fuchs Retires After 26 Years Service

After 26 years with the British Antarctic Survey Sir Vivian Fuchs retired from his post as director on September 10. He will be succeeded by Dr Richard Laws, who has been head of the Survey's life sciences division since 1969, and like Sir Vivian Fuchs, has worked in East Africa.

Sir Vivian Fuchs began his association with polar exploration in 1929 when he was a member of a Cambridge University expedition to Greenland, led by Sir James Wordie, who served with Shackleton on the 1914-16 expedition in the *Endurance*. His association with the Antarctic began after the Second World War when he was appointed field leader of the Falkland Islands Dependency Survey, as B.A.S. was then called. He was in charge of seven Antarctic bases carrying out a comprehensive programme of survey and scientific work, and spent two years himself at Stonington Island, Marguerite Bay.

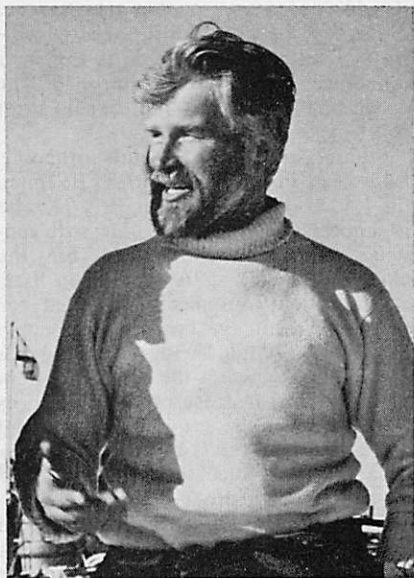
Before the Second World War Sir Vivian Fuchs worked in the tropics. He was with four expeditions to East Africa, studying the geology and archaeology of the Great Rift Valley. These gave him sound knowledge of field craft, and provided material for his doctoral thesis in geology.

Two years as field leader of F.I.D.S. gave Sir Vivian Fuchs valuable experience in the art of extensive polar travel. His final dog sledge journey to the southern end of George VI Sound was more than 1000 miles. For his work in this period he was awarded the Royal Geographical Society's Founder's Medal in 1951, and the Polar Medal in 1953.

When he returned to Britain in 1950 Sir Vivian Fuchs was given the task of establishing a F.I.D.S. scientific bureau to handle all information coming from British bases in the Antarctic and arrange for publication of the scientific results. This he did until 1955 when he

was given leave of absence for three years to organise and lead the Commonwealth Trans-Antarctic Expedition, which made the crossing of Antarctica from Shackleton Base to Scott Base in 1957-58.

Since 1958 Sir Vivian Fuchs has been responsible for the logistics as well as the scientific work of the British Antarctic Survey. He has served on various advisory committees for many years, and is also a past president of the British Association for the Advancement of Science.



SIR VIVIAN FUCHS

His successor, Dr Laws, graduated from Cambridge in 1947 with first-class honours in zoology. He spent 1948 and 1949 at the F.I.D.S. base on Signy Island in the South Orkneys, and 1951 on South Georgia, studying the elephant seal. Then for two years he worked on his material, gaining his Ph.D. degree in 1953.

After a season on South Georgia as a whaling inspector, Dr Laws joined the National Institute of Oceanography in 1954 and continued to work on whales. In 1961 he became director of the Nuffield Unit of Tropical Animal Ecology in Uganda, and for eight years worked particularly on the ecology and behaviour of large mammals.

Since 1969 Dr Laws has been responsible for the B.A.S. life sciences division, which is located at the Monks Wood experimental station of the Nature Conservancy. He is chairman of the S.C.A.R., sub-committee of specialists on seals.

Dr Laws received the Bruce Memorial Medal for his Antarctic work in 1954, and the Scientific Medal of the Zoological Society of London in 1965. His publications include a number of papers on seals and whales.

WINTER ACTIVITIES

Long periods of bad weather have restricted outside activities at all the B.A.S. bases. Much of the time has been spent on routine chores, redecorating buildings, repairing installations, and overhauling vehicles and sledging equipment in preparation for the resumption of field work.

One of the men at the Argentine Islands base, Michael Butterfield, was injured when he lost his footing on a smooth ice slope, and slipped over a 30ft ice cliff, landing on hard sea ice. In addition to a broken femur he suffered some internal injuries.

There is no doctor at the base, but as there were adequate medical supplies and regular medical advice and instructions could be given over the teleprinter or radio from London, the Falkland Islands, and Adelaide Island, it was con-

sidered preferable to treat Butterfield at the base rather than attempt to evacuate him. His fracture and other injuries have been treated successfully, and he is making a good recovery.

FIELD WORK

Work has continued on the new base buildings at Halley Bay. They should be ready for full occupation in the summer. Access shafts have been extended as the present huts have been drifted over by snow.

Routine observations have been continued at all bases. In addition, field parties from Stonington Island were able to work on the plateau and glaciers north of the base until the beginning of June, and on the glaciers and a nearby island in July. Halley Bay glaciologists were able to work locally, and at the Argentine Islands good sea ice provided a welcome opportunity for some of the men to get away for a few days from the narrow confines of Galindez Island.

On South Georgia, with its less severe climate, short trips to various field huts have been possible, and also to Barff Peninsula to work on the reindeer herd, and check the seismological equipment.

In between such trips the "fleet" has been overhauled. This includes a 31ft whale towing boat and a 21ft sealers' launch, both bought from the old Grytviken whaling station, and a 25ft steel-hulled launch which will be taken to Signy Island as soon as a slipway can be built there. This was scheduled for last season, but persistent ice prevented the relief ships from delivering the necessary materials in time. Three dinghies, one fibreglass and two inflatable, complete the "fleet".

The men on South Georgia are living on a somewhat less varied diet than usual since a fire in June destroyed the chicken house and 16 of the 18 birds in it. Unfortunately those that perished were completely incinerated, so the men could not enjoy a sudden glut of roast chicken. Since then an all-night fire watch has been maintained.

Mid-winter Day was celebrated at all bases in appropriate style. The South

Georgia men also organised a competition to see who could spread the most widely believed and outrageous rumour. During the winter darts and chee matches have been played between the bases, and with the Americans at Palmer Station, on Anvers Island, and with the South Africans on Gough Island.

Only one foreign visit was recorded during the winter. The Russian trawler Salekhard arrived at South Georgia seeking medical help for an injured member of the crew. As there is no doctor at the base, arrangements were made for the man to be taken to the Falkland Islands.

SOVIET NEWS

EXPEDITION WILL BE LARGEST SINCE 1956

Russkaya, the new Soviet station at Cape Burks, on the Hobbs Coast of Marie Byrd Land, will not be opened for a year. The 18th Soviet Antarctic Expedition failed to establish the station—one of its main tasks—because bad weather prevented the supply and research ship Ob coming closer than 200 miles to the ice-bound shores of the Hobbs Coast.

This year the Soviet Union will send more than 400 scientists and specialists to the Antarctic. The 19th Soviet Antarctic Expedition, which will leave next month, will be the biggest since Soviet Antarctic operations began in 1956, according to the leader, Mr D. Maksuvov.

As in past years the new Soviet expedition will participate in research studies under international scientific co-operation programmes. Polish biologists will study Antarctic fauna at Bellingshausen Station on King George Island in the South Shetlands, and geodesists from the German Democratic Republic will work at Molodezhnaya Station. There will also be an exchange of Soviet and American scientists.

Although Russkaya could not be established last season, food and equipment were left there for the party which will spend next winter at the seventh Soviet research station in the Antarctic. The Ob took a winter party, food, and equipment early this year. Three temporary houses, food, and some equipment were flown to Cape Burke by the ship's large twin-engined Mi-8 helicopter, but work had to be discontinued because of icing of the Ob.

For the 19th expedition in the coming season the scientific programme will cover a whole range of studies of the nature of Antarctica from its crystalline foundation to outer space. The programme includes the use of rockets for sounding of the upper atmosphere, and completion of the study of the mountains inland from the MacRobertson Coast of the Davis Sea near the gigantic Amery Ice Shelf.

Tests will be made of new meteorological facilities for the automatic collection of weather information. A computer centre with three computers will start functioning at Molodezhnaya, the main Soviet research centre in Antarctica. Mr Maksuvov says that construction of buildings will be a major part of the programme of the new expedition. Two-storey houses, prefabricated from heat-insulated panels, will be assembled at Mirny, the oldest

Soviet station. For strength and durability they will be built on rock not covered with ice.

Research associates of the U.S.S.R. Academy of Sciences Institute of Zoology spent 2000 hours under the Antarctic ice in the course of 18 months. This group of scientists conducted summer and winter investigations of the underwater world in the Davis Sea off Mirny Station.

The idea of biological observations from one base for a whole year was advanced by Mr M. Propp, organiser of the first expedition of scuba divers to the Antarctic in 1965-66. At that time scuba diving off the coast of Antarctica was regarded as something fantastic. Before that nobody had seen the underwater world in these places "from within" because of difficult ice conditions. The first systematic observations by Soviet biologists will provide the ground for more work by scientists studying the Antarctic coastal zone.

WINTER RESEARCH

In summer observations were conducted from the coast, and in winter through unfrozen patches of water over which tents were pitched. The scientists wanted to find out how marine organisms adapted themselves to winter since the two-metre thick ice floes and drifting snow do not let the sun's rays penetrate, the water temperature always remains below zero, and phytoplankton can be found only for a few months.

Investigations were made at a depth of up to 60 metres. So they would not have to go through prolonged decompression the scuba divers remained at a depth of more than 50 metres not more than 15 minutes. They not only observed the life of the marine animals and collected some types of submarine inhabitants, but also took pictures of the oceanic flora and fauna.

Underwater photography often makes it possible to cast a new look at the quantitative and qualitative evaluation of animals. The Institute of Zoology has developed a special lens to obtain high-quality pictures.

Many interesting and often surprising discoveries were made in the winter. The long "lakes" in the strange, ice-free area of Bunger's Oasis, thought to be a gulf, proved to be fresh water reservoirs deprived of all life. A complete hydro-biological cross-section of Adams Island in McDonald Bay showed that some 400 animal species live near Mirny.

Investigations by Ukrainian geophysicists have shown Antarctica's age to be 4000 million years, not 2000 million as was believed earlier. They analysed granite-like rock and crystalline shales collected in Enderby Land, not far from Molodezhnaya Station. The age of the rock and shales was determined by the correlation of uranium, thorium, and lead in samples.

Professor E. Sobotovich, of the Institute of Geochemistry and Mineral Physics, Ukrainian Academy of Sciences, says that such old granite-like rocks are a great rarity on the surface of the planet. Similar crystalline shales have been found by American scientists in Greenland and by Soviet explorers in the Far East. They proved to be a bit younger than the Antarctic finds—3900 million years.

Professor Sobotovich says these new facts are of great importance in the elucidation of the processes which took place on earth in the distant past. They also contribute to understanding of the formation of the terrestrial crust and the planets of the solar system.

MANY TOURISTS

Since it was built five years ago Bellingshausen Station has become an Antarctic tourist attraction. It has been visited by 500 tourists from more than 20 countries. Among the station's guests last season were the underwater explorer, Commander Jacques Cousteau, his son Philine, and the crew of the oceanographic research ship Calypso.

Bellingshausen Station is on Waterloo Island, known to the British as King George Island. It has a "wet" climate—pouring rain, snow falls or thick fog occur nearly every day—and the men there have to cope with a combination

of ice-cruled ground and stormy winds. Despite these difficulties the 18th Soviet expedition built an oil depot, a mess-room and a radio station, last season.

The scientific programme at Bellingshausen Station last season included the study of plants and animals. A collection of the rare flora, including algae, mosses, and lichens, was gathered by a biologist, I. Nikolayev. He found cereals and imprints of leaves of araucaria, which grew in the Antarctic some 200 million years ago. This magnificent evergreen still grows in Brazil, Chile, and the South Seas to a height of 150ft. The collection of flora has been placed in the Botanical Museum in Leningrad.

Waterloo Island is between the Antarctic Peninsula and Tierra del Fuego,

and is in an area where ships can be used (without the aid of ice-breakers) for six to eight months of the year. Permanent weather observations can be made, and radio sounding balloons can be launched from ships to study the upper atmosphere and forecast cyclones. Moving with a speed of 50 to 60 kilometres an hour, these often cause storms in the South Atlantic and are a serious threat to ships in the area.

From Bellingshausen Station Soviet scientists make observations of the stability of radio-wave propagation in the higher latitudes of the Southern Hemisphere. These are of great importance for sea, air, and space navigation and communications.

CARETAKERS AS TOURIST GUIDES

Two members of the New Zealand Antarctic Society who will go to Cape Royds this summer to look after the historic huts there and at Cape Evans will have an extra job. They will act as guides to 90 American tourists who will visit McMurdo Sound in late December aboard the cruise ship Lindblad Explorer.

There have been volunteer caretakers from the Antarctic Society for the last four summers by arrangement with the Antarctic Division of the Department of Scientific and Industrial Research, which provides special clothing, transport, food, and accommodation. This season the caretakers, selected from a number of applicants, will be Messrs L. E. Kerr, aged 49, a schoolteacher, of Christchurch, and G. E. Madgwick, aged 60, a business administrator, of Wellington.

Mr Kerr was a member of the Otago branch of the Antarctic Society from 1951 to 1954, and joined the Canterbury branch when he came to Christchurch. He served in the Royal New Zealand Air Force in the Second World War, and trained in Canada. He is a member of the Otago branch of the New Zealand Alpine Club.

Mr Madgwick has had a lifelong

interest in the Antarctic, and has been a member of the Antarctic Society's Wellington branch for a number of years. He served in the New Zealand Army during the Second World War with the rank of captain. He has been a keen alpinist.

Mr R. B. Thomson, superintendent of the Antarctic Division, has arranged for the two men to go to the Antarctic in mid-December so that they will be at Cape Royds while the Lindblad Explorer is in McMurdo Sound. Their job will be to see that the penguins and historic huts are not unduly disturbed by the tourists, and to act as guides.

The Lindblad Explorer will leave Bluff on December 22, and on her journey to the Antarctic will call at several sub-Antarctic islands. She is due in McMurdo Sound on January 8, and the tourists will visit Scott Base the next day. After the ship leaves McMurdo Sound, she will sail to the Antarctic Peninsula where she is due on January 16. The cruise will end at Punta Arenas, Chile, on January 25.

Two more cruises to the Antarctic Peninsula will be made by the Lindblad Explorer this summer. Both will start and finish at Punta Arenas.

Ob Breaks Free From Ice After 450-mile Drift

Trapped in heavy pack ice for 90 days the veteran Soviet research and supply ship *Ob* finally broke free on July 22. She was caught first in the ice off the King George V Coast and drifted 450 miles to the Davis Sea in the Indian Ocean sector of Antarctica. High winds and waves broke up the ice field of the Ballen Massif which held the ship fast, and dynamite was used by the crew to break up the 16ft high hummock ice which had surrounded her since early May.

Six scientists left aboard the *Ob* used their enforced imprisonment in the ice to good advantage. They set up tents and makeshift laboratories on the ice around the ship, and were able to study conditions in an area where no ships can navigate in winter. Dr Yevgeny Tolstikov, the veteran Soviet Antarctic authority, who headed the special commission set up to assist the *Ob*, said after the ship had broken free, that some of the scientists were even glad to find themselves in such a situation because they had never studied drifting ice in the Davis Sea, and they were interested in the relationship of the ship and the ice.

A review of Soviet activities in the Antarctic last season compiled for "Antarctic," corrects some of the newspaper reports on which our report about the *Ob* in the June issue was based. Although the *Ob* was unable to establish the winter party at Russkaya, the new station on the Hobbs Coast of Marie Byrd Land, she performed most of her other tasks.

When the *Ob* left Leningrad on December 4 last year she took scientists and several thousand tons of cargo for the 18th Soviet Antarctic Expedition to Mirny, Molodezhnava, and Leningradskaya, off the Oates Coast. But she still had winter parties to pick up when she was hit by a Force 12 gale off the King George V Coast. Unusually low temperatures caused ice formation, and the ship was soon surrounded by hummock

ice which built up to a height of 9ft to 16ft.

There were 140 men aboard the *Ob* when she was trapped. The cargo ice-breaker *Navarin*, which was at Fremantle when the *Ob* reported she was in trouble, took fuel and fresh food south. She and the research ship *Professor Zubov*, which was sent from Leningrad in mid-May, took 67 men off the *Ob*, which used her Mi-8 helicopter and Antonov 2 aircraft in the operation.

Fifty-five men from the *Ob* returned to Fremantle aboard the *Professor Zubov* on July 3. The others were transferred to the *Navarin*. Fifty members of the crew, 17 airmen, and six scientists remained on the *Ob*, hoping that the ship would be freed when she drifted into the warmer waters of the Indian Ocean in the spring.

Captain Sergei Volkov, master of the *Ob*, completed another task a few days after his ship broke free. He picked up 40 men from Molodezhnava Station on his way back to Leningrad. They arrived home several months later than expected.

The *Ob* has now joined the company of the *Belgica*, the *Deutschland*, and the *Aurora*. Mr Boris Krutskikh, deputy director of the Arctic and Antarctic Institute, says her entrapment will undoubtedly go down in the history of world polar research. He describes the episode not only as an example of courage by seamen and scientists but also as a valuable contribution to science about the nature of Antarctica.

Flights to McMurdo Sound start of U.S. Operations

United States operations in the Antarctic for the 1973-74 season began early this month when two ski-equipped Hercules aircraft flew from Christchurch to McMurdo Sound with mail, milk, and fresh fruit and vegetables for the 158 men of the winter party on Ross Island. The aircraft also took scientists who will do early research, drillers for the Dry Valley Drilling Project, and an advance party to prepare Williams Field, six miles from the station, for the start of the summer scientific programme on October 9.

This summer Starlifters of the United States Air Force Military Airlift Command will make 32 flights south with men and materials for scientific and construction work. United States Navy Hercules aircraft of VXE6 Squadron will ferry more than 450 tons of cargo and supplies from McMurdo Station to the South Pole in November and December. Men of Mobile Construction Battalion 71 (Seabees) and civilian contractors will work to complete the major portion of the new Amundsen-Scott South Pole Station so that scientists can winter there in 1975.

A survey to decide whether a blue ice runway for wheeled aircraft can be established in the Dufek Massif region of the Pensacola Mountains, about 500 miles from the South Pole on the Weddell Sea side of the continent, will be made this season by a team from the United States Army Cold Regions Research and Engineering Laboratory. Three prospective sites were selected near the Dufek Massif last season but the survey could not be made because of the shortage of Hercules aircraft. This season the field party will be flown to the area with two tracked vehicles.

The Pensacola Mountains survey will be made to determine whether there are areas of blue ice which could support heavy cargo aircraft without extensive site preparation. Such a site would make future air operations in the Antarctic Peninsula and Weddell Sea areas more flexible. This year VXE6 Squadron will

be better equipped for work in the Antarctic; in November and December it will have two of its three new Hercules aircraft, provided by the National Science Foundation. They can carry more than the present aircraft.

Major projects in the research programme will include participation in the international Dry Valley Drilling Project with the New Zealanders and the Japanese. The work will be supported by helicopters of VXE6 Squadron. Later in the season preliminary work will begin on the Ross Ice Shelf survey. A field team of scientists from several disciplines will visit a small grid network of stations. The National Science Foundation plans to use a Twin Otter aircraft flown under contract for the survey, with tracked vehicles providing secondary support if necessary.

Last season the United States naval support force completed the new Siple Station at the foot of the Sentinel Mountains in Ellsworth Land, 1250 miles from McMurdo Station. Since February four scientists have worked there on magnetospheric and ionospheric investigations, which are linked with the station's geomagnetic conjugate at Roberval, Quebec, Canada.

The first winter scientific activity at the station since 1970 has provided much revolutionary data. This summer supporting and correlative experiments will be conducted to allow monitoring of interactions between the various phenomena observed. The station's

buildings and equipment will be checked and rehabilitated where necessary to offset the effects of snow accumulation.

Since the National Science Foundation became responsible for United States scientific operations in Antarctica it has allotted an increasing number of activities to civilian contractors. This season Palmer Station will be transferred from the naval support force to a civilian contractor. The research vessel Hero, which is based at the station on Anvers Island, off the Antarctic Peninsula, has been operated under a civilian contract, and it will now be under the station management.

Another change will be made at McMurdo Station this season. Twenty-five civilians will be provided by Holmes and Narver Incorporated, the National Science Foundation's principal contractor, to work in the station mess hall. They will relieve men of the naval support force.

Last season the winter party at McMurdo Station had to wait longer than expected for its first fresh food and mail for nearly seven months. Bad weather delayed the pre-season flights, and aircraft had to turn back twice on the way south from Christchurch. This month, however, high winds, low clouds, blowing snow, and limited visibility at McMurdo Station, delayed the first flight of the two VXE6 Squadron Hercules aircraft for only a day.

In the early hours of September 3 the two aircraft left Christchurch with 26 passengers (scientists and construction

workers), and 6000lb of cargo, including mail, milk, fresh fruit and vegetables. The first left at 2.30 a.m. and the second at 3 a.m. They landed on the Williams Field ski-way at 10 a.m. and 10.45 a.m. Most welcome item in their cargo, next to the mail, was the fresh milk. The 157 Americans and one Russian exchange scientist have had to make do with powdered milk since February.

Both aircraft stayed on the ice only long enough to be unloaded and refuelled. They were back in Christchurch at 7.38 p.m. and 8.50 p.m. respectively. On September 5 the two aircraft left Christchurch at 1.30 a.m. and 2 a.m. with another 6000lb of cargo and 24 passengers, including nine New Zealand drillers who will work on the Dry Valley Drilling Project. They reached the Williams Field ski-way at 9 a.m. and 9.30 a.m. and touched down at Christchurch Airport at 6.25 p.m. and 8.15 p.m.

One passenger on the first flight south was a woman, the Chinese wife of Dr A. L. DeVries, of the University of California, San Diego. She and her husband will continue last season's research on the adaptations which prevent some Antarctic fishes from freezing although they spend their lives at the freezing point of seawater. Other scientists from the Virginia Polytechnic Institute and State University, and the Scripps Institution of Oceanography flew south to study the modelling of Antarctic fresh water and terrestrial ecosystems, and the physiology and biochemistry of the fish in McMurdo Sound.

Seabees to Work for Last Time at Pole Station

Seabees, men of the United States Navy's Mobile Construction Battalions, will work in the Antarctic for the last time this season. Since the Navy began its support of scientific activities nearly 20 years ago all major construction has been done by Seabees.

Now civilian contractors for the National Science Foundation will do the construction projects in future years. But the Seabees of Mobile Construction Battalion 71 will finish the job they started three years ago—the \$3.5 million complex of buildings which will form the new Amundsen-Scott South Pole Station.

Seabees built the first station at the South Pole in 1956. This season they will build three connected two-storey buildings inside the geodesic dome—55ft high and 164ft in diameter—which they finished on January 8 this year. But the new station will not be occupied winter and summer until 1975.

To provide the logistic support for the United States Antarctic Research Programme this season nearly 2000 men from the Navy, Army, Air Force, and Coast Guard, and other specialised units, will be involved, and about 1500 of them will spend the summer in Antarctica. For the first time the Navy will take a woman officer, Lieutenant Ann Coyer, to McMurdo Station to serve as administration officer of the support force.

More than 200 scientists, 10 of them women, from 23 American state universities, 14 specialised research agencies, and six foreign nations, will conduct research projects for the National Science Foundation this year. The research planned will be done from six American Antarctic stations, and aboard two United States Coast Guard icebreakers working in Antarctic waters.

Urgently needed cargo for this summer's construction programme is being brought to Lyttelton by the Military Sealift Command cargo ship Private John R. Towle. Most of the 2300 tons will be flown from Christchurch to McMurdo Station early in the season on the 32 United States Air Force Starlifter flights—the first of which will be made on October 9.

In the five months of the season Navy Hercules aircraft will deliver 500 tons of supplies, spare parts, and about 100 tons of fresh food and mail to inland stations. They will operate from

Williams Field, six miles from McMurdo Station.

For the fifth successive year the tanker Maumee will deliver more than six million gallons of fuel at Winter Quarters Bay, McMurdo Station. Both the Maumee and the Private John R. Towle are expected to berth at the man-made ice wharf.

The Royal New Zealand Air Force will assist the Navy's logistic support effort. Its Hercules aircraft will make ten flights between Christchurch and McMurdo Station.

TWO WOMEN TO WINTER

Two women biologists will spend next winter in the Antarctic—the first American scientists of their sex to do so. They are Dr Mary A. McWhinnie, professor of biological sciences at De Paul University, Chicago, and Sister Mary Odile Cahoon, of Minnesota. A Polish scientist will work with them in their studies of krill, the shrimp-like crustaceans endemic to Antarctic waters.

Dr McWhinnie has been a frequent visitor to New Zealand since her first Antarctic cruise aboard the scientific research ship *Eltanin* in July, 1962. She has sailed south from many ports, including Wellington, Auckland, and Lyttelton.

The two women will be among more than 175 scientists engaged in the United States Antarctic Research Programme, whose research will involve 65 projects. These range from ionospheric studies to an analysis of cores from rock drilled beneath the dry valley lakes which never freeze over.

Other projects will include studies of the role of the Antarctic in relation to the world's weather patterns, and a continuing evaluation of the continent's mineral resources.

This year's Antarctic research grants from the National Science Foundation's Office of Polar Programmes amount to \$US7.5 million.

WINTER MAIL DELIVERED TO 169 MEN ON ROSS ISLAND

Men of three nations wintering in the Antarctic received mail from home last month for the first time since February instead of waiting for it until October. To make the first winter mail delivery on August 1 a Royal New Zealand Air Force Orion of No. 5 (Maritime) Squadron made a non-stop flight of 4500 miles in 12 hours from Dunedin to McMurdo Sound and back.

Six canvas mail bags attached to small parachutes were dropped from the Orion into the winter gloom—barely equal to twilight—above the ice runway of Williams Field. Inside the bags were letters, newspapers, and magazines, for the 11 New Zealanders at Scott Base, and the 157 Americans and one Russian exchange scientist at McMurdo Station. As well as mail the aircraft dropped a container of special medicine, and a plastic part to repair one of McMurdo Station's four washing machines, which had broken down.

Wing Commander P. J. McKay, commanding officer of No. 5 Squadron, was in command of the Orion, which loaded 840lb of personal mail, 50lb of it for Scott Base, at Christchurch on July 30. It then flew to Dunedin, but was unable to make the flight to McMurdo Sound on July 31 as planned because a fault was discovered in the generator system of one of the engines.

EASY FLIGHT

On August 1 the Orion took off at 6.54 a.m. for McMurdo Sound. The flight south at 28,000ft was uneventful, and shortly after mid-day the aircraft was ready to start its descent to Williams Field where the weather was overcast with light snow and a 10-knot wind.

When the Orion came out of the cloud cover at 12.21 p.m. and began its descent to the lighted runway it turned on its landing lights. On the first run at a height of 700ft the first two mail bags, which each carried two small lights,

separated from their parachutes and dropped like rocks, bouncing 6ft as they hit the snow.

As the Orion passed overhead on the second run Lieutenant R. Hudson, the co-ordinator of the mail recovery party, suddenly remarked: "Hey; it's raining mail." He was right. One of the mail bags had split open, showering its contents into the wind.

So the recovery party could start chasing the contents of the split bag the final run was expedited. The parachutes did not separate, and the bags landed right on the target. But the men waiting for their mail had some anxious moments until they learned that the split bag contained no personal mail, and the priority cargo in it was safe. The remaining contents were magazines and newspapers, more than half of which were recovered.

Thank-you messages were relayed to Wing Commander McKay and his crew by Commander G. Blessing, the commanding officer at McMurdo Station, and Major P. G. Frazer, leader at Scott Base. By 7.15 p.m. when the 169 McMurdo Sound residents had long finished reading and re-reading their mail from home, the Orion was back at Dunedin.



Drilling near Mizuho Camp in Japanese Programme

Ice core drilling to a depth of 1650ft near Mizuho, the small inland camp 185 miles south-east of Syowa Station, by a group of glaciologists for three or four months next winter, and inland glaciological traverses in the summer of 1974-75, are among the planned activities of the 15th Japanese Antarctic Research Expedition (JARE 15) for 1973-75. Forty men of the expedition, led by Mr Masayoshi Murayama, director of the Polar Research Centre, National Science Museum, will leave Tokyo aboard the icebreaker Fuji, which is commanded by Captain Mamoru Morita.

Syowa Station's winter party, led by Dr Takeo Hirasawa, has completed the JARE 14 sounding rocket programme. The party reported to the Polar Research Centre on August 25 that the last rocket had been launched successfully on August 23. Seven sounding rockets were taken to Syowa Station for measuring physical parameters in aurora during the polar night.

Dr Hirasawa, an upper atmosphere physicist at the University of Tokyo, supervised the launching programme. The first rocket was launched on February 15 successfully, and there were no failures in the launching and measurement of the others, which reached altitudes of 60 to 80 miles.

All the men at Syowa Station are reported well after months of winter isolation. Some have gone to Mizuho for glaciological research. Others are in the field for earth sciences observations.

JARE 15's leader, Mr Murayama, who will also lead the 1973-74 summer party of ten men, is a veteran of Antarctic research. He is returning to Syowa Station for the seventh time. His last visit was in 1967-69 as leader of JARE 9, and leader of the magnificent traverse to the South Pole in 1968-69. This time he will be on board the Fuji with nine men of the summer party for the whole of her cruise until April 20, 1974.

Two members of the headquarters staff of JARE will join the summer mission. They are Dr Kiyoo Wadati,

former president of the Science Council of Japan, and Dr Masasi Miyadi, former director of the Tokyo Astronomical Observatory. Both are 70 years old. One or two exchange scientists from other nations will join the summer party at the invitation of the Japanese Government.

After leaving Tokyo the Fuji will make her usual call at Fremantle from December 10 to 16 before proceeding to Syowa Station. She will call at Cape Town and Singapore on the return voyage to Japan, and is expected to reach Tokyo on April 20 next year.

The first helicopter flight from the ship to Syowa Station will be made about January 1. The formal change-over of the JARE 14 winter party and JARE 15 will be made on February 20. During the relief operation field observations will be made in biology, geology, geomorphology, limnology, and geodetic survey work will be continued. Oceanographic and meteorological observations will be made aboard the Fuji during her cruise.

The winter party of 30 will be led by Mr Nozomi Murakoshi, chief of the department of expeditions, Polar Research Centre. He has spent two winters at Syowa Station, and has been with the summer party three times.

Programmes of station observations will cover aurora, geomagnetism, the ionosphere, meteorology, earthquakes, ocean tides, geodesy and cartography,

human physiology, geology, geochemistry, geomorphology, biology, and glaciology. Field observations near the station will be made in biology, geochemistry, geomorphology, and geology.

Glacial and meteorological observations will be made near Mizuho by the group of glaciologists who are concerned with the winter ice core drilling programme. Mr Okitsugu Watanabe, who was a glaciologist with JARE 11, will lead the inland glaciological traverse party in the summer of 1974-75. It will resurvey strain grids and measure snow accumulation stakes installed in 1970-71 by JARE 11.

Members of the 15th expedition are:

SUMMER PARTY (1973-74)

Messrs Masayoshi Murayama (leader); Ikuji Tokue (physical oceanographer); Masataka Hishida (chemical oceanographer); Takaharu Hoshino (marine biologist); Aiichiro Yoshimura (surveyor); Masakatsu Abe (surveyor); Dr Keisuke Kobayashi (biologist); Messrs Sakae Karasawa (biologist); Masafumi

Yamanaka (construction engineer); Seizo Noake (logistics assistant).

WINTER PARTY (1973-75)

Messrs Nozomi Murakoshi, deputy leader (leader of winter party); Takehiko Suzuki, Yuji Yasutomi, Norio Hayashi, Takeo Shinohara (meteorologists); Ichiro Yamazaki (ionosphere physicist); Hideki Kaneko (geophysicist); Isao Shiro, Natsuo Sato (upper atmosphere physicists); Okitsugu Watanabe, Masayuki Inoue, Kazuhide Sato (glaciologists); Kiichi Moriwaki (geomorphologist); Dr Keizo Yanai (geologist); Messrs Kazuhiko Watanabe (human physiologist); Mitsuo Yamanaka (biologist); Masataka Sano (geochemist); Shingo Kaneko (diesel mechanic); Nobuyoshi Nagaoka (electric fitter); Takashi Igarashi (mechanic) and one to be appointed; Shige-kazu Inamura, Kimio Minato, Masafumi Igarashi (radio operators); Hideo Kozakai, Kaneyoshi Hanayama (cooks); Isao Fujii (surgeon); Yoshitsugu Horikoshi (aviation pilot); Tsugio Imamura (aviation engineer); Kei Terai (logistician).



Two Cruises by Spanish Ships

Two Spanish ships will take tourists to the Antarctic Peninsula in the 1973-74 season. The cruises have been arranged by an Argentine shipping and airline organisation, which represents the Spanish shipping company, Ybarra and Company, S.A., of Seville.

The Cabo San Roque and the Cabo San Vicente will each carry 265 passengers. They will call at Ushuaia, the most southerly city in the world, on the island of Tierra del Fuego, and Port Stanley, Falkland Islands, which are known to Argentina as the Isla Malvinas.

On the first cruise from January 3 to January 19 the tourists will sail from Buenos Aires to Ushuaia, and then cruise among the islands off the Antarctic Peninsula. Calls will be made at the Melchior Islands where there is an Argentine naval detachment, and the scientific stations Almirante Brown in Paradise Bay, the Esperanza at the tip of Trinity Peninsula. A call will be made at Port Stanley before returning to Buenos Aires.

The first cruise will be made by the Cabo San Roque. On the second from January 11 to January 27 the Cabo San Vicente will also call at Montevideo.

A.N.A.R.E.

Automatic Observatory to Be Set Up South of Casey

After two years of field trials of unmanned observatory instruments the Antarctic Division of the Department of Science is planning for next year an exercise to establish an observatory complex about 320 kilometres south of Casey along the Casey-Vostok line. This automatic geophysical station will record auroral, geomagnetic, ionospheric and micro-meteorological data on digital magnetic tapes for periods of a year, maintaining timing accuracy within one second, and consuming 1.3 watts of power.

During this winter trials have been made of equipment for down-hole sampling, and for deep meltsonde probing in the Casey area. For 1974 it is planned to core-drill a hole near to bedrock a few kilometres upstream from the previous Cape Folger hole at a position where the ice thickness is still less than 500 kilometres.

The aim is to fill the hole after drilling to enable horizontal shear to be measured over a long period by preventing closure of the hole. Temperature and inclination changes will be logged, and the ice from the hole returned to Australia for detailed analysis. Later next year it is planned to drill a deeper hole further inland.

The field party from Mawson, which established a fuel depot at Moore Pyramid, 200 miles south of the base ("Antarctic," June, p. 354) was expected to return by the end of May. But the return journey of the six men was dogged by continuous bad weather. High winds, poor visibility and heavy drift greatly inhibited travel, and one week the party covered only five miles. It battled its way into Mawson finally on June 14.

Emperor penguin counts were made at Taylor Glacier, 50 miles west of Mawson, and the Auster rookery, 35 miles to the east, by dog sledge and

motor toboggan parties in June and July. A dog sledge left Mawson on July 30 for the rookery at Fold Island.

Recent biological investigations at David Station have included the culturing of fungi and studies of plankton. Seven different types of diatom were also observed.

The records from an auroral radar, recently erected at Mawson, will correlate station data from Davis, including riometer, all-sky camera, VLF, magnetometer, and magnetic micro-pulsation records. A second auroral radar, recently erected at Casey, will look in the direction of the auroral "invariant" pole.

The glaciological field party which left Casey on March 15 to make observations along the Casey-Vostok line ("Antarctic," June, p. 354) returned to the station on May 24. Another glaciological field party, equipped with a Nodwell vehicle and a Caterpillar D5 tractor, with caravans and sledges, left Casey on July 22 for a planned six-week traverse on the Law Dome in order to take meltsonde readings and make geociever surveys.

An extensive concrete foundation was poured at Macquarie Island in June in preparation for the new meteorological complex which will be erected there this summer. The work was done in spite of persistent bad weather.

WHALING COMMISSION FIXES QUOTAS FOR 1973-74 SEASON

Whale catch quotas for the 1973-74 Antarctic season and the 1974 season elsewhere were reduced by 1100 when the International Whaling Commission held its 25th annual meeting in London. For the second time the commission rejected a United States resolution calling for a 10-year moratorium on all commercial whaling for all species. The resolution failed to gain the necessary two-thirds majority from the 14 member nations represented.

Catch limits set by the commission were based on information provided by its scientific committee, and are expressed in stock units. Quotas for the three major whaling regions are:

Antarctic: 1450 fin whales (with the provision that the taking of this species should cease at the end of the June, 1976, season); 4500 sei and Bryde's whales; 5000 minke whales.

North Pacific: 550 fin whales; 3000 sei and Bryde's whales; 6000 male and 4000 female sperm whales.

Southern Hemisphere: 8000 male and 5000 female sperm whales.

FIN WHALES

In the case of the fin whale, the limit is expected to continue the process of restoring the stock. For each of the other species, the limit is at or below the replacement yield.

The proposed moratorium was considered by the commission's scientific committee which agreed that because the concept of individual species management was now operative, there was no biological requirement at the present time for the imposition of a blanket moratorium on all commercial whaling.

A resolution proposing a cessation of whaling for ten years, beginning not later than three years from the present time was adopted by the technical committee by a majority. But the commission did not accept it as the resolution

failed to obtain the necessary three-quarters majority in favour.

Last year the commission asked the chairman to appoint a committee to make proposals for implementing the recommendations by the United Nations environmental conference at Stockholm that the commission should be strengthened to increase international research effort. The report of the committee recommending the appointment of a full-time secretariat headed by a scientist was accepted but the commission could not agree on proposals in the report for financing the expanded organisation. Consideration was deferred until next year's meeting.

14 NATIONS

All 14 member nations were represented at the meeting of the commission, the chairman being Mr I. Rindal, of Norway. Observers from non-member nations, the Food and Agriculture Organisation, international scientific bodies and conservation organisations were present, and were given the opportunity to address the meeting.

Only six of the member nations of the commission now do any whaling. They are Japan, the Soviet Union, Norway, South Africa, Australia, and Iceland. The other members are the United States, the United Kingdom, France, Argentina, Mexico, Canada, Panama, and Denmark.

EXPLORERS' AIRCRAFT ON STAMPS

Three new Australian Antarctic Territory stamps shown here and on the opposite page are part of a set of 12 issued last month for use at ANARE bases in the Antarctic and on Macquarie Island. Six aircraft used by expeditions in the Antarctic during the 1920's and 1930's are illustrated in one set, and the other set of food chain stamps illustrates how creatures in the Antarctic are interdependent for food and survival.

The denominations and titles of the food chain stamps are: 1c plankton, 7c Adelie penguins, 9c leopard seal, 10c killer whale, 20c albatross, and \$1 sperm whale. Denominations and titles of the explorers' aircraft are: 5c Mawson's DH Gipsy Moth 1931, 8c Rymill's DH Fox Moth 1934-37, 25c Wilkins' Lockheed Vega 1928, 30c Ellsworth's Northrop Gamma 1935, 35c Christensen's Avro Avian 1934, and 50c Byrd's Ford Tri-Motor 1929.

The de Havilland Gipsy Moth used on the British and Australian, and New

Zealand Antarctic Research Expedition (BANZARE) led by Sir Douglas Mawson in 1929-31, is shown above (right). Below it is the de Havilland Fox Moth used by John Rymill, an Australian explorer, on the expedition he led to Graham Land in 1934-37. The Avro Avian was used for reconnaissance flights in 1934 by the Norwegian whaling fleet owner, Lars Christensen. In 1933-34 he made a near-circumnavigation of Antarctica in the whaling fleet tanker Thorshavn, starting from Cape Town and ending at Montevideo. Flights were made in the Avro Avian off the Lars



Christensen's Avro Avian



Mawson's Gipsy Moth



Rymill's Fox Moth another musical interest.

Christensen Coast, and the Leopold and Astrid Coast was sighted.

The small single-engined wooden Fox Moth used by Rymill is a reminder of one of the most efficient small expeditions to have explored in the Antarctic. A South Australian who had been in Greenland, Rymill used an old Brittany fishing schooner rechristened the Penola. It was a three-masted topsail schooner of 130 tons, fitted with two auxiliary diesel engines. Rymill also used a motor tractor and sledge dogs.

DEATH OF TERRA NOVA VETERAN

One of the veterans of Scott's last expedition, Edward A. McKenzie, died in Minster, Kent, last month, at the age of 85. He was a leading stoker in the Royal Navy when he joined the crew of the Terra Nova as a 22-year-old from H.M.S. Indomitable.

There were four men from the Indomitable aboard the Terra Nova. They were Chief Engine-room Artificer William Williams, who became the ship's engineer, Leading Stokers William Burton and Robert Brissenden, and McKenzie. Brissenden was drowned on August 17, 1912, in French Pass when the Terra Nova was engaged on a survey of Admiralty Bay, Marlborough Sounds, before she returned to the Antarctic for the second time. Williams is also dead, but Mr Burton is among the surviving members of the crew. He and William McDonald, an able seaman in the Terra Nova, both live in Christchurch.

After the expedition McKenzie joined the Thames division of the Metropolitan Police in London and served with it for 27 years. He was a particularly active man, and was still giving lectures about Scott and the expedition when he was past 80. He built a working model of the Terra Nova which is now in the Science Museum in London. When he served in the Terra Nova he used to play the mandolin; later the banjo became

SANAE REPORTS

Strong Winds Affect Night Programme at Base

July this year was one of the warmest so far recorded at South Africa's Sanae Base in western Queen Maud Land. Meteorologically the month was extraordinary with the mean temperature about 12deg C warmer than in 1972. This is ascribed to a high mean wind speed which caused turbulent mixing in the lower layer of the atmosphere.

In July the mean temperature was minus 25deg C compared with minus 36deg C in the same month last year. The lowest temperature was minus 43.8 deg C and the highest minus 6.5deg C. Comparative figures last year were minus 49.3deg C and minus 18.9deg C.

Because of unforeseen strong winds the night programme at Sanae Base did not function very well. Although Aurora Australis was very active in July, the strong winds brought clouds over the base and very few observations could be made. The magnetic field was also very quiet and virtually no problems were experienced with radio communications.

A wind of 180 kilometres an hour was recorded at Grunehogan where four men are wintering. According to the surveyor, Mr R. Sevcik, who is there for his second consecutive year, it was the worst he has experienced in the expedition's working area.

Field work will start towards the end of August. A party will also depart from Sanae Base and hopes to reach the mountain area towards the end of the month.

GOUGH ISLAND

One of the most experienced teams to leave South Africa for quite a time will sail in the research ship RSA on her annual relief voyage to Gough Island on October 5. Four of the seven members of the team, Messrs J. A. Taljard, leader

and senior technician (meteorology), F. Potgieter, technician (meteorology), W. I. Pretorius (radio operator) and J. A. Jacobs (male nurse) have already spent a year either in the Antarctic or at one of the island bases. The others are Messrs I. M. Nigrini and E. Kriek, technicians (meteorology) and J. Pokorny, technician (radio).

The present team at Gough Island is still playing its part in weather prediction with the aid of weather satellites. At present ESSA 8 operating on 137.62 mHz is being received by way of the steerable crossed yagi antenna. Time and position predictions for each minute of a pass are received by radio telex, and these enable the antenna to be positioned accurately during the pass.

Picture information from ESSA is conveyed by means of frequency modulating a carrier, and thus amplitude variations caused by range and altitude variations do not affect the picture information.

With the system on Gough Island this picture information has to be retransmitted to the Weather Bureau in Pretoria 4000 kilometres away. To achieve this the output of the satellite receiver which produces the picture information in an amplitude modulated signal is first passed through an AM to FM converter.

This unit converts the signal back to a frequency modulated tone varying from 2300 Hertz for black to a 1500 Hertz for white. The signal then

becomes independent of fades normally occurring on short wave radio transmissions, and is transmitted by a one kilowatt short wave transmitter to Pretoria.

In the Weather Bureau at Pretoria the signal is received demodulated. Finally it produces a photograph which, regrettably, the team members never see.

Because of extremely unsettled weather, team members have to stick to indoor amusements during the winter. Chess is much favoured, and matches are played with Tristan da Cunha, the Argentine Islands, off the Antarctic Peninsula, and a player in Botswana.

Mice races along the passages are the latest form of amusement. The island teems with mice brought there by old-time whalers and explorers. Although

scores are being killed continuously, their numbers do not seem to diminish much.

MARION ISLAND

On Marion Island the members of the meteorological team are at last the only inhabitants. The 16 members of the building team from the Department of Public Works have completed their work, which included the erection of several new buildings, one being an extension of Marion House to provide sufficient accommodation for further expansion of scientific programmes.

The RSA arrived at the island on July 27 to pick up the P.W.D. team. En route a geophysical survey was carried out by the Bernard Price Institute of Geophysical Research.



Grunchogna, the geological base of the South African National Antarctic Expedition, which was established in western Queen Maud Land on May 8, 1971. It is 215 kilometres south of Sanae Base in the Ahlman Ridge mountain range, and its geographic position is 72deg 02min 01sec South/02deg 48min 03sec West.

On board to join the expedition was Mr P. Condy, of the Mammal Research Institute of the University of Pretoria. He recently instituted research on the behaviour, ecology, and physiology of the two seal species—southern elephant seal (*mirounga leonina*) and southern fur seal (*arctocephalus tropicalis*)—occurring on the island.

Mr W. Wilkinson, a meteorologist, also returned to Marion Island on the second voyage of the RSA. He hurt his eye during the take-over period in April and had to return to South Africa for treatment. His eye was not permanently damaged and as the RSA was scheduled to visit the island twice in three months because of the extensive building programme he was able to return to complete his tour of duty.

Field work in the seal research programme on the island will include

studies of social behaviour, adaptive value of territories, the role of non-territorial males, reproductive and mother-young behaviour, and types and topography of beaches selected for hauling out.

Physiological aspects to be investigated include reproductive state at various times of the year, and subsequent laboratory studies of blood, urine and various tissue samples. Special attention will be given to recruitment of the populations, population size and structure, individual growth patterns and mortality rates, and the role of vocalizations in communication.

Because so little is known of the biology of the southern fur seal on Marion Island and elsewhere, a concerted effort will be made to get as much information as possible on this species.



\$US50,000 GRANT TO MUSEUM

A grant of \$US50,000 has been made by the United States National Science Foundation towards the Antarctic centre of the Canterbury Museum in Christchurch. Dr H. Guyford Stever, director of the foundation, who announced the grant last month, said it was most important that knowledge of past and current Antarctic events be made available to the public and visiting scholars and scientists.

For many years Christchurch and New Zealand have served key roles in international exploration and research in the continent of Antarctica, said Dr Stever. Men now legendary have passed this way and left their mark.

Scientists of many nations continue to cross paths here on their way to search out, and later share, knowledge of the

continent, and of the earth and its environment. In that sense, Christchurch, Canterbury, and New Zealand, are truly international centres of history and centres of activity concerning Antarctica.

The Canterbury Museum Trust Board will use the grant to support the appointment of an Antarctic curator or librarian for a minimum of two years; the construction and presentation of large-scale displays of Antarctic wild life; the purchase of Antarctic graphic archives and books; and the provision of specialist technical aids for visiting scientists using the Antarctic library.

The National Science Foundation has authorised use of part of the grant to support an overseas mission by Dr R. S. Duff, director of the museum. He will acquaint the Antarctic Treaty nations of the establishment of the Antarctic centre.

New Zealand party works in Antarctic volcano

By HAROLD LOWE

When Edgeworth David, of Shackleton's expedition led a party of six to the summit of Mt Erebus in 1908 it was a great achievement for these men, inexperienced as they were in mountaineering. Then, in 1912, when Raymond Priestley, of Scott's last expedition, led the second ascent, three of his party, including himself, had barely recovered from their ordeal of an Antarctic winter in an ice cave. The accounts of these early explorations make fascinating reading as do those of other ascents that have been made since then, but today the helicopter has simplified the task.

Six men of New Zealand's Antarctic Research Programme (1972-73) were carried 35 miles from Scott Base and landed with their equipment and supplies on the north side of the 12,450ft volcano, about 450ft below its crater summit. A United States Navy helicopter made two trips on December 24 last year to land the men: Graeme Lyon, scientific leader; Werner Giggenschbach, chemist; Harold Lowe, field leader; John Shorland, field assistant; Philip Kyle, geologist; and John Keyes, assistant.

A camp was established on a flat area of snow-covered lava and rock where three tents were pitched. There seemed to be an awareness of the high altitude, and over-exertion had to be avoided although no one had any immediate symptoms of sickness. The men had gone from sea level to 12,000ft in less than half an hour and had work to do.

The sun shone brightly accompanied by a light wind, and the temperature did not seem to be -20degC which the thermometer registered. After a light meal two of the party climbed the remaining 450ft of the mountain to the crater's edge.

On the afternoon of Christmas Day three of the party climbed to the summit, walked round the crater rim and back to the camp, a trip which took two hours and a half.

Late in the afternoon Christmas dinner was prepared, each tent undertaking part of the menu. The extra

delicacies unfortunately were not appreciated because of the effects of altitude sickness which had overtaken each man. Headache, throbbing of the heart, bouts of high temperature for short periods, loss of appetite, sleeplessness, nausea, eye irritations and symptoms of the common cold, were experienced.

However, the whole party crammed into one tent to partake of the meal as appetites permitted but much was uneaten. Festive wine was taken like medicine and there was little Christmas atmosphere until radio contact was made with Scott Base, Vanda Station and other field parties.

The party's main task was the collection of gas samples from within the crater. This required a descent by winch and cable into the crater, the walls of which were nearly vertical. The site selected for the winch was directly above the camp site at a place which appeared to be the lowest part of the crater rim. This position provided the shortest distance for carrying equipment from the camp and the shortest descent into the crater. Being on the lee side the clouds of steam and gases emitted from the mountain would not impede the work.

About 400ft below the selected winch site is an outer crater with an ice-covered floor. The active crater is within this taking up about one-third of the area. The active crater is against the eastern wall of the outer one and its depth is estimated to be about 400ft

from the outer crater floor. Directly above the active crater the rim of the outer crater is much higher than it is at the winch site.

From this high point the depth to the bottom of the active crater is estimated to be no less than 1000ft. This high part of the crater rim was first considered for the winch site but was rejected because of the limitations of the hand winch and equipment and because of the activity within.

All the equipment had to be carried from the camp site. The winch and attached cable weighed 120lb and the polar tent 70lb. There were also metal stakes, sledge hammer, extra cable, ropes and other items as well as personal gear.

WINCH ANCHORED

When the tent was carried up the hill the winch was already anchored in place. As the tent bearers approached, the end of a 200ft length of steel cable was attached to the tent. The other end was slipped through an anchored carabiner and as it was easily and quickly hauled downhill, the carriers and tent were, with all haste and much amusement, hauled up to their destination.

Between times the area had been explored. There were many fumaroles with ice pinnacles and mounds built up around their orifices by the emission of steam which condenses and freezes.

Near the camp a very interesting fumarole was discovered and explored. A 21ft rope ladder hanging from the top just reached the bottom. The diameter of the fumarole at the surface was about 10ft and at the bottom about 20ft. Two tunnels led from it horizontally and its sides exposed alternate layers of lava and ice. There were, just as David's men had found, enormous quantities of "large and perfect crystals of anorthoclase feldspar two to three inches long."

On the western side of the main crater there is another fumarole which is now extinct. Here the slopes are easy graded and fairly ice-free with

numerous fumarole ice mounds. Apart from the south-west perimeter of the main crater much of the area is free of ice.

One thousand feet down to the east of the camp was a United States Coast Guard helicopter, abandoned in 1970, and now full of snow. An unusual find was a pair of rubber sandals. A survival tent which had been erected alongside the helicopter had lost its fabric to the winds, leaving only poles and guylines.

On December 30 the winch had to be covered with the tent to protect the operators from the biting wind. All was set for a descent into the crater, but cloud and snow at times enclosed the camp and mountain top, confining the men to their tents.

On New Year's Day, one of the party collapsed into a semi-coma in his tent and was unresponsive for 30 minutes. Oxygen was administered and he regained consciousness by the time he was evacuated from the mountain by helicopter.

BAD HEADACHE

When the patient arrived at the McMurdo Station dispensary he was found to be suffering from no more than a moderately severe headache. The diagnosis was altitude sickness and possible chronic carbon monoxide poisoning, but there were no subsequent symptoms in the next 48 hours.

Later it was suggested that a contributing factor to the collapse may have been a lack of oxygen caused by burning a stove in the tent in the rarefied atmosphere.

Finally when the weather cleared two successful descents were made into the crater and samples were taken.

The completion of this operation and the successful collection of gas samples has meant that a basis has been established for a more ambitious programme within the crater. This will demand experienced climbers familiar with face rescue techniques and equipment. The high altitude and cold add to the hazards but scientific and field staffs are keen to participate.



SOVIET UNION AND JAPAN SEEK ANTARCTIC KRILL

Soviet Union stern factory trawlers equipped with machines to produce protein-rich paste from krill, the minute shrimp-like crustaceans found in oceans of the world, are operating in Antarctic waters. The Japanese are also interested in exploitation of krill, and last year had a ship working in the Weddell Sea with a target of 1000 tons.

Eighteen months ago the Soviet Union announced that it had established a permanent expedition to explore and exploit fishery stocks, including krill, in Antarctic waters. "Australian Fisheries" reports that as many as seven Soviet factory ships operated in the area around the Kerguelen Islands in sub-Antarctic waters between Australia and South Africa, and were accompanied by about 100 catcher vessels.

Concentrations of krill are greatest in the North Pacific, North Atlantic, and Antarctic Oceans. In the Antarctic Ocean, where krill is an important food for baleen whales, the maximum sustainable yield has been estimated at between 60 and 100 million tons annually.

PASTE MACHINES

The Soviet Federal Research Institute of Fisheries and Oceanography recently built machines that produce protein-rich paste from krill. Six have been installed aboard factory stern trawlers, and one has been set up ashore to produce protein paste from Black Sea shrimp.

Each machine, operated by two persons, can process one ton of fresh krill an hour, yielding between 440lb and 660lb of protein paste. This is packed in blocks of either 9oz or 6½lb.

Various agencies in the Soviet Union are engaged in a publicity and promotion campaign to sell krill paste and an allied product, cheese with krill paste. Recipes for preparation of dishes with krill paste are being circulated in food stores, and export prospects are being explored.

Russian scientists and technicians overcame several problems in the development of the Antarctic krill fishery.

A special pelagic trawl was designed to catch the krill and there were also difficulties in handling and processing the crustaceans which spoil quickly because they are small and delicate.

To process krill for human consumption a plant was designed to crush the raw krill to extract the juice, and by heating, to coagulate the protein in the juice. Special arrangements were made to store the paste in good condition. It can be kept for about a year if held at minus 18deg C.

The Japanese have plans to produce krill extracts experimentally. Last year the ship which went to the Weddell Sea was chartered by the semi-government Marine Fishery Resources Development Centre. It was proposed to freeze 800 tons of fresh krill, and 200 tons cooked.

COD CATCHES

Antarctic krill are reported to have attracted the interest of a fishery association named Antarktika, which has been established at Odessa on the Black Sea. No indication has been given of the species of fish which will be the target for the association's fleet. But in the past Soviet fishing vessels have taken considerable quantities of notothenia, a cod-like species found in cold waters, including the Antarctic.

The new association's fleet consists of Vostok, the world's largest fishing vessel, the former whaling mother ship Soviet-skaya Ukraina (32,000 tons), several Atlantic class stern trawlers, and the stern trawler Van Gogh, which specialises in shrimp research and fishing.

Canneries, processing plants, and ship-repair yards in five Black Sea cities will support the association's fleet.

SUB-ANTARCTIC

Whales and spring lambs come to Campbell Island

Right whales moving up from the south have been sighted regularly by members of the expedition on Campbell Island since early July. Thirty were seen on one occasion in North-West Bay, and the men have watched several hurling themselves completely clear of the water.

Spring has come to the island with the sighting of the first skua, and the equinoxial gales have followed. Several tiny spring lambs have been seen, and the drab peat hills are changing in the new season. Pleurophyllum plants are appearing, there are buds and flowers on the dracophyllum spears, and the bulbinella are pushing through the peat to add their lighter shades of green to the slopes.

In a report from the island at the end of last month the leader, Graham Canfield, says that winter has been without its usual extremes of cold. July produced the highest average pressure ever recorded, 1021.6 millibars, and the highest screen temperature minimum of 1.1deg Celsius.

A long spell of calm weather has characterised this period, although there has been no stratus cloud cover for any length of time. Only 1.5 hours of sunshine were recorded in June.

For some months a group of sea-lions numbering up to 60 in some cases was observed battling for control of a small harem. Moving from area to area, staying only to flatten the tussock and defoul each site, they had one site directly in front of the hostel. Cavorting about 30ft away, they gave us some sleepless nights.

Apparently flounders form a large part of their local diet. When catching these fish they bring them to the surface where they are shaken vigorously before being eaten. They practise this technique on sticks or rocks picked up from the harbour bottom when not actively involved in catching fish.

Few sea-elephants have arrived yet but by September harems should be formed and pups born.

Fresh vegetables and mail were dropped by a Royal New Zealand Air Force Bristol Freighter on August 8 despite easterly winds gusting to 58 knots. As conditions at the dropping

site were not so stormy ten parachutes landed successfully. At the time the only mechanical transport—boat—was on survey, and all the stores had to be carried more than a mile back to camp.

A new outlet for the hydrogen shed has been dug, the slipway has been relaid, and a new turntable has been built for the railway system. There was a temporary halt when the main power supply lines to both the ionosonde and technical buildings failed within three days of one another.

Emergency lines were hastily erected until the main lines were operational. The scientific programmes were reduced to rough observations, data being transmitted by radio. Power for transmission was provided by using 100yds of flex plugged into a three-pin socket in the powerhouse.

Radio contact has been established with Scott Base and Macquarie Island on occasions but atmospheric conditions usually play havoc with circuits.

With the annual relief only six weeks away there is an expectant air about the camp. The work programmes are winding up, and spring cleaning is beginning.

Training for next year's expedition is now under way. Rex Firman will lead the new team, which includes Bob Taylor, Allan Yule, Neil Arnold (meteorologists); Peter Wood and John Walden (summer support); Jim Barnes (chef); Rob McVinnie (mechanic); Les Thom and Dick Roberts (technicians); and Roger Jones (ionosphere observer).

THE READER WRITES

Sidelights of Antarctic Research

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

ISOLATED PARTIES

Hawthorn,
Victoria,
Australia.

Sir.—In the March issue of "Antarctic" the correspondent covering the story of Siple Station mentioned that the four scientists manning it will be the smallest isolated group to winter over since 1934.

Either the correspondent is restricting his statement to American parties or is completely unaware of at least two other groups of four or less members wintering over, and both without the additional comforts provided by the modern American logistics.

A group of three manned South Ice station inland from Shackleton base for six months and a half during the 1957 winter before setting out on the trans-Antarctic crossing. Later in 1968 four Australians wintered for ten months on the Amery Ice Shelf, living in two small caravans.

There are undoubtedly other occasions, but the above examples are probably the best known.

Yours, etc.,
M. J. CORRY.

[If the article about Siple Station had described the four scientists as the smallest American group all would have been well. We are grateful to Mr Corry for his reference to the three men at South Ice, and agree that there must have been similar small parties at other Antarctic bases. For the record South Ice was manned by Hal Lister (glaciolo-

gist), Ken Blaiklock (surveyor and meteorologist), and Jon Stephenson (geologist and glaciologist). Stephenson was an Australian.]

SHACKLETON'S SLEDGE

54 Crofton Road,
Bishopdale,
Christchurch.

Sir.—In the March issue of "Antarctic" on Page 314 there is an article about Shackleton's motor sledge which refers to its Simplex engine being brought back to New Zealand through the good offices of Rear-Admiral D. F. Welch, a former commander of the United States Navy's Antarctic support force.

The Simplex engine was returned to New Zealand by favour of the Antarctic Division, D.S.I.R. I was storekeeper at Scott Base for the 1970-71 season. During a caretaker trip to Cape Evans I collected the motor and returned it personally to Scott Base. I crated the motor and returned it to the Antarctic Division in Christchurch for forwarding to the Canterbury Museum.

Yours, etc.,
G. W. NATION.

[We are glad to give credit to Mr Nation and the Antarctic Division for their part in Operation Simplex. In the March, 1971, issue of "Antarctic", Dr R. S. Duff, director of the Canterbury Museum, was quoted as saying that Rear-Admiral Welch had offered to re-unite the Simplex engine with the sledge, provided the engine could be obtained and shipped in the 1970-71 season.]

ANTARCTIC BOOKSHELF



THE ROSS DEPENDENCY

By F. M. Auburn

Published by Martinus Nijhoff, The Hague, Holland, 1972.

82 pages plus index and extensive bibliography.

"The treaty states that it does not mean that contracting parties are renouncing claims to territorial sovereignty in Antarctica. It states that it does not mean that the contracting parties agree to renunciation or diminution of claims to territorial sovereignty. It states it does not prejudice the position of any parties with respect to their recognition or non-recognition of the right or claim of any other State. It does not state, however, what it does mean."

This confusion, expressed with a wry humour by Senator Gruening, of Alaska, when the American Senate was debating the Antarctic Treaty more than a decade ago, might be taken as the basic theme of Mr Auburn's extended discussion of New Zealand's position in Antarctica and the terms under which any claim to the Ross Dependency might be sustained.

From his position as an expert on international law at the University of Auckland, Mr Auburn has written the most extended and authoritative account of the status of the dependency which is readily available. He has drawn heavily on Canadian, Russian and Norwegian claims in the Arctic and has brought together, in one slim, entertaining volume, a mass of evidence which will delight anyone interested in the complexities of Antarctic legalities—or the vagaries of international law.

The "sector theory", the convenient mechanism by which the Antarctic was tentatively divided, like a large round of cheese, between States which were willing and able to make claims in the heroic days of Antarctic exploration, has a respectable, if confused history in connection with the northern polar cap.

It has even older connections with the "spheres of influence" philosophy which guided the colonial division of Africa and finally reached a climax in the Congress of Berlin in 1884. But in the Antarctic, because sector claims are based on the conflicting criteria of proximity and discovery, the degree of overlapping would lead to impossible complexity if this alone guided claims.

New Zealand, for example, has claimed a much larger sector in the Ross Dependency than its geographic position would justify. And if claims can be based simply on drawing southward lines of longitude which intersect no other country why should Sri Lanka, the Malagasy Republic, and Indonesia, to name but a few countries, not lay claim to portions of Antarctica?

In the Northern Hemisphere this problem has been solved largely by a recognition of a State's ability to establish some sort of recognisable *de facto* administration over the area claimed: for Canada it has even involved moving the paraphernalia of a Court to an Arctic island where an offence is alleged to have occurred so that Canadian jurisdiction can be shown to be effective.

But, according to Mr Auburn—and it is difficult to refute him—New Zealand's claim to the Ross Dependency is, so far, a good deal more tenuous. It rests partly on proximity and the drawing of segments, partly on a British claim which has only been transferred by implication to New Zealand, and partly on a tenuous occupancy which might certainly be disputed by the United States were it prepared to lodge any territorial claims in the Antarctic.

And the claim is complicated by the peculiar nature of the Ross Sea. Does New Zealand claim sovereignty or jurisdiction over the Ross Ice Shelf? If so, does it extend the claim, as it logically might, to those segments of the shelf which break off and become giant icebergs? Does the claim extend to the territorial shelf underneath the ice. These are not merely academic questions when the possibility of mineral exploration and exploitation under sea ice is becoming a reality.

To attempt to reduce Mr Auburn's arguments to the compass of a review would be to do him an injustice and to confuse the very complex technical questions involved. Readers who care—and that should mean everyone in New Zealand with an interest in the Antarctic—ought to read this book. But the author's conclusions do deserve the widest possible audience.

He argues that New Zealand's Antarctic programme has been wrongly directed if this country intends seriously to lay claim to exclusive or even limited sovereignty over the segment of Antarctica which lies closest to these shores. Scientific endeavour which depends for its logistic support on the United States is hardly a valid expression of sovereignty. Instead, New Zealand officials should be asserting this country's claim by demonstrating a determination to administer the Ross Dependency which extends beyond the issuing of occasional sets of postage stamps for the territory, especially when most of the inhabitants—American servicemen—are not required to use them.

Mr Auburn suggests that New Zealand's interests demand a viable regime for the Ross Dependency; that any uni-

lateral proposal from Wellington to internationalise the territory would renounce New Zealand's claim without necessarily gaining anything for this country from the other signatories of the treaty; and that the viable solution might lie in forming a condominium with the United States.

This, in fact, is surely what already exists. New Zealand and the United States know that if the questions were pressed—as it might be if, for example, a United States civilian were to be accused of murder in the Ross Dependency—there is an unresolved dispute about sovereignty. To form a condominium would be to admit the dispute and recognise that it can continue unresolved. But in the meantime, an effective administration could be provided, not unlike that which exists between Britain and France in the New Hebrides.

A condominium, according to Mr Auburn, would be the only form of administration not inconsistent with the treaty, which has so far worked well and been scrupulously observed. It would unite the rights of the United States mentioned in the treaty with the claim of New Zealand which antedates the treaty.

Such a solution would involve some diminution of New Zealand's claim to sovereignty over the whole Ross Dependency. But, as Mr Auburn concludes: "The struggle to reconcile political and diplomatic reality with the exigencies of juristic logic is now beginning. The time has come for a review of New Zealand's Antarctic programme and policy in the light of the advance of technology and international law."

—N.H.

THE POLAR ROSSES

By Ernest S. Dodge

Faber and Faber, London, 1973

Pp. Illustrations, maps, index. English price, £2.95.

In the very first words of his preface the author says, "It is curious that two explorers as eminent as Sir John and Sir James Clark Ross should both have

waited until now to have a book devoted to them."

This is fair comment but the pity is that having undertaken the task, Mr

Dodge, who is an American with several historical works to his credit, should now have confined his writing to one of a series of books on "great travellers."

This means that from the large amount of material available on these two notable explorers the author has crowded his story into some 260 pages. As he admits "(it) makes it necessary to limit this work largely to their explorations and related activities."

Here let it be said that when dealing with the Arctic voyages of the two Rosses, the author has covered the ground well. However, from this reviewer's standpoint it is unfortunate that the important Antarctic voyages of Sir James are dismissed in one chapter—a total of 36 pages!

It is fairly evident that whatever Mr Dodge knows of the Arctic regions and their history he has less knowledge of the Antarctic. While he concludes his account of J. C. Ross by stating "this was one of the greatest voyages of discovery and exploration ever made",

his textual description hardly supports his dictum.

Ross Island, lying some 50 miles from the Antarctic mainland and separated from it by McMurdo Sound (Ross's McMurdo Bay) must be the most historic portion of Antarctica, but not once does the author refer to it by its present name. He twice calls it by Ross's name High Island (Page 199) without any cross reference, not even in the index.

This first voyage, which did so much for Antarctic history, opening as it did the gateway for the great expeditions of the early years of this century, deserves a great deal more than Mr Dodge has given it.

The illustrations are adequate but the maps are little help. The Antarctic map on Page 197 is too small and there are no ships' tracks shown. Moreover, Mt Erebus has been moved to a point some 150 miles along the face of the Barrier (Ross Ice Shelf) from its true position on Ross Island.—H.F.G.

MORPHOLOGY OF THE EARTH IN THE ANTARCTIC AND SUBANTARCTIC

By B. C. Heezen, Marie Tharp, and C. R. Bentley,

Antarctic Map Folio Series, Folio 16, American Geographical Society,
New York, 1972. 16 p., 8 plates.

This folio continues the high standards established in the earlier folios. The eight plates are: (1) Submarine and subglacial topography; (2) Soundings and earthquakes; (3) Physiographic and tectonic provinces; (4) Submarine topography of the Scotia Sea; (5) Sea floor profiles (sheet 1); (6) Sea floor profiles (sheet 2); (7) Subglacial topography (8) Subglacial soundings.

The main maps are those showing the submarine topography and morphotectonic provinces of the Southern Oceans, south of approximately 30deg S. A polar stereographic projection is used, and the maps thereby serve an important secondary function by showing better than normally the shapes and relationships of the major southern landmasses. With the current intense interest in global tectonics and crustal

history, Plates 1 and 3 especially will serve as basic reference maps.

A wide range of data sources, American, French, Russian, British, New Zealand and many others some as recent as 1971, has been used in the preparation of the maps. Plates 2 and 8 show the basic data in the form of submarine and subglacial sounding lines coded according to reliability and earthquake epicentres. The authors caution that several areas are inadequately sounded for fully accurate maps to be compiled. To bridge these gaps the cartography is "conceptual".

In their contouring the authors have "been guided by a uniformitarian steady-state philosophy of morphogenesis," which is to say that in their concept each major segment of oceanic crust has evolved by spreading from a

mid-ocean ridge. Consequently, as known from areas of detailed soundings in the Southern Oceans and in Northern Hemisphere seas, each mid-ocean ridge should be topped by a rift-valley, be dislocated by transverse fracture zones, and towards the bounding continents on either side pass into an abyssal plain, unless detail shows otherwise. Areas of sparse data are contoured accordingly.

Errors have resulted, as more recent data collections show, but they do not deny the value of the maps presented.

The map showing the subglacial topography and the probable preglacial shoreline of Antarctica is especially useful, and complements the maps of submarine topography. It serves to reinforce the separate geological character of East and West Antarctica, and will be used widely by scientists investigating crustal evolution in the Southern Hemisphere.

The accompanying text summarises the soundings, voyages, and techniques used, presents and defends the cartographic philosophy adopted, and discusses the major features delineated by the maps. Provided one accepts the cartographic philosophy adopted, criticisms are few. New Zealand's geology is misrepresented in detail, if not in general, and one suspects detail elsewhere may have been bent to fit the adopted concepts. I would like to have seen the east and west meridians distinguished on all maps, and the compiler, method, and the date of the sounding lines shown.

The maps are excellently printed and coloured, and together comprise an important addition to our map catalogue.

PETER B. ANDREWS, Ph.D.,
SEDIMENTATION LABORATORY,
NEW ZEALAND GEOGRAPHICAL
SURVEY,
CHRISTCHURCH.



TV STATION IN ANTARCTICA

Antarctica's first closed circuit television system should be operating at McMurdo Station by mid-November. After that servicemen and scientists will enjoy 62 hours of programmes weekly, and only a week after the programmes are screened in Los Angeles.

Thirty receiving sets will be shipped to McMurdo Sound aboard the cargo

ship Private John R. Towle. When the sets arrive in late December they will be placed in lounges and clubs at the station, at the Williams Field camp near the ice runway, which is six miles away, and at Scott Base.

The television station will provide information, news, and entertainment, and also live programmes.



“ANTARCTIC”

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

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

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

The New Zealand Antarctic Society (Inc.)

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

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

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

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

New Zealand Secretary

Mrs B. Hale, P.O. Box 1223, Christchurch.

Branch Secretaries

Canterbury: Mrs E. F. Cross, P.O. Box 404, Christchurch.

Wellington: Mr R. H. Blezard, P.O. Box 2110, Wellington.