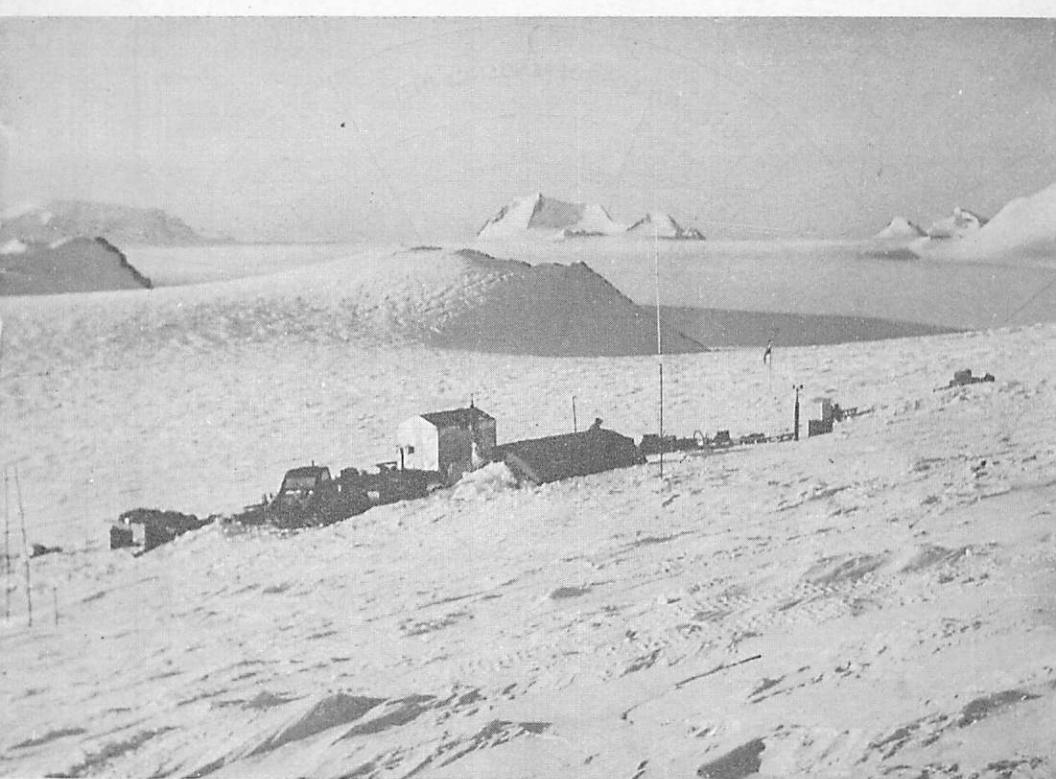


ANTARCTIC

A NEWS BULLETIN

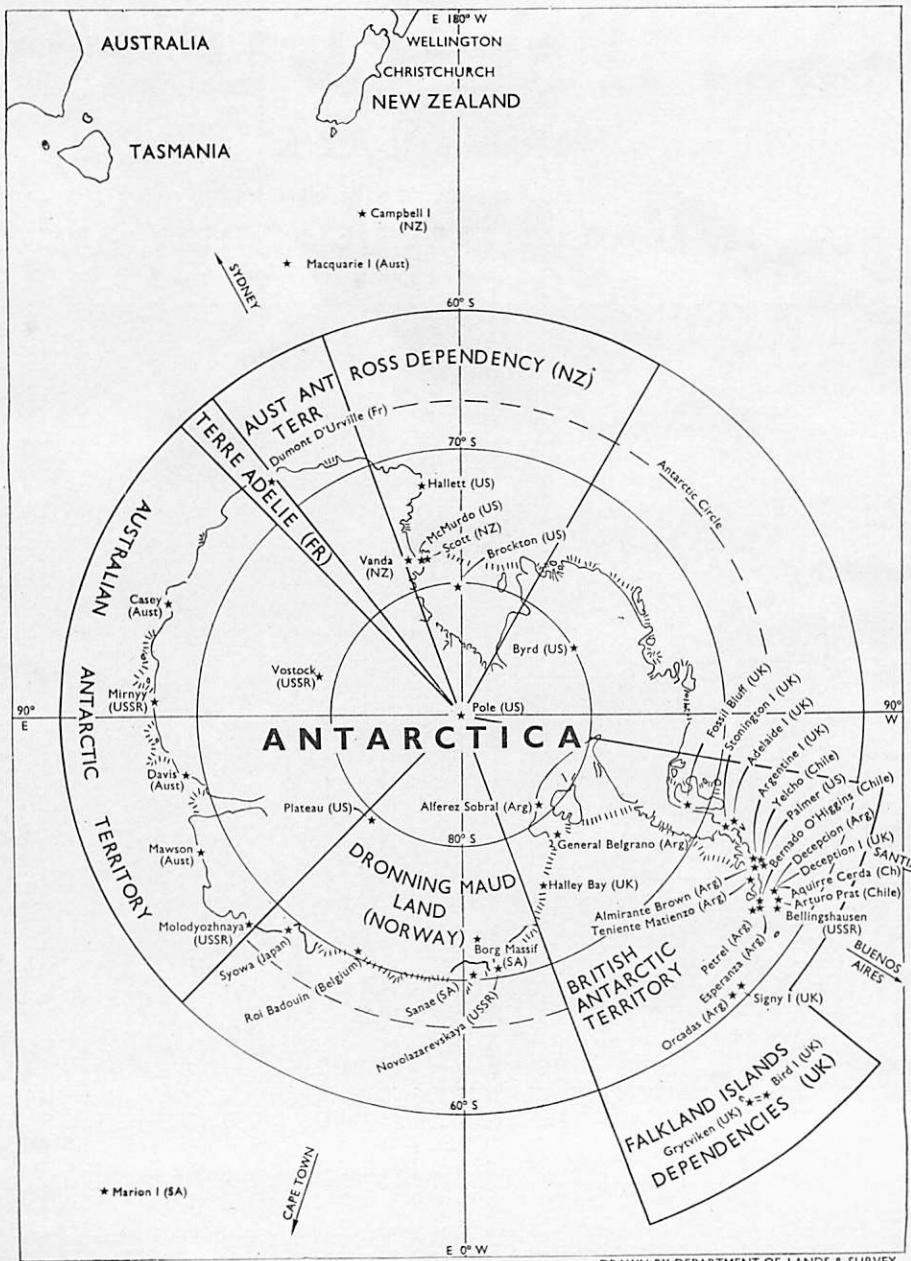
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NEW ZEALAND ANTARCTIC SOCIETY (INC)



BORGA BASE, A WINTERING STATION OF THE SOUTH AFRICAN NATIONAL ANTARCTIC EXPEDITION IN WESTERN QUEEN MAUD LAND. ESTABLISHED IN MAY, 1969* THE BASE IS 350 KILOMETRES SOUTH OF THE MAIN BASE, SANAE. IT WAS BUILT AT A HEIGHT OF 7920FT IN THE BORGE MASSIF, NEAR THE HULDRESLOTTET NUNATAK, AND IS LOCATED AT 72 DEG 50 MIN S - 3DEG 48 MIN W.

South African Geological Survey Photo



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Winter is always cold in Antarctica; this year it will be colder for the men living there. The fuel crisis has hit the world's coldest continent, and Americans and New Zealanders in the Ross Dependency will have to conserve the oil which provides all heating and power. Men—and two women—may suffer some discomfort because of the crisis; sledge dogs may have their day again. Motor toboggans have supplanted them in recent years. But toboggans need fuel. Dogs need only human energy and food.

NEW ZEALAND DRILLERS COMPLETE PROGRAMME

Drilling on the Antarctic Continent was the main project in New Zealand's Antarctic research programme for the 1973-74 season. New Zealand drillers began work on Ross Island early in September, and bored the deepest hole—378.7 metres—drilled on land in Antarctica. Then they moved across McMurdo Sound to the dry valleys, and before ending their operations in the middle of January drilled the deepest hole—305.79 metres—on the continent itself.

United States, New Zealand, and Japanese scientists participated in the Dry Valley Drilling Project—a major three-year programme developed by scientific organisations of the three countries. In the past season New Zealand had full responsibility for all drilling operations needed in the DVDP. Late in May Japanese, United States, and New Zealand scientists will meet in Seattle to study the preliminary results of the past season. They will then select sites for the 1974-75 stage of the project.

After they finished their work on Ross Island and at Lake Vanda in the Wright Valley, 80 miles west of the island (Antarctic, December, 1973, Pages 415 and 416), the New Zealand drillers moved to an unusual body of water—Don Juan Pond—also in the Wright Valley. The water in this pond is so salty that it does not freeze even at temperatures of minus 70 deg. Fahrenheit.

Drilling on the west side of the pond through 180ft of sediment into crystalline rock began early in December. But about 11ft down the drilling crew struck a granite boulder. The drill rig was tilted at an angle to try to bypass the boulder, but granite was struck again. Then the drillers tried to penetrate the granite, hoping to reach sediment, but water started to rise in the hole. Because there was no way to control the flow, which might have contaminated the pond and disturbed its natural environment, drilling was stopped. Don Juan Pond is considered

to be the saltiest lake in the world, with a calcium chloride concentration of about 45 per cent.

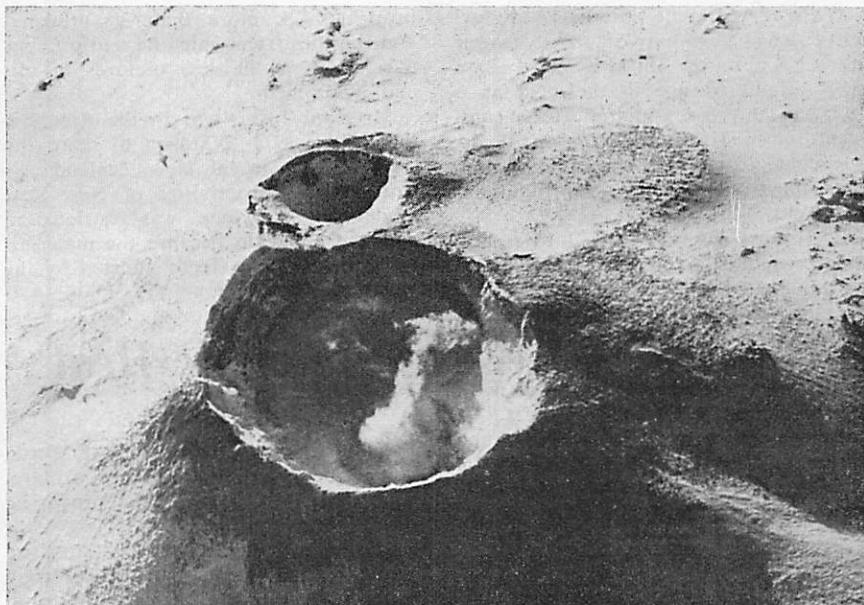
VICTORIA VALLEY

Next the drillers moved to Lake Vida in the Victoria Valley. There they began drilling through sediment into crystalline rock at the west end near the shoreline. Drilling stopped temporarily at 248.4 metres when the team ran out of drilling rods, but the hole reached a depth of 305.79 metres before work was stopped.

Towards the end of December the drilling team began drilling its fifth hole in Antarctica at Lake Fryxell in the Taylor Valley. Originally it was planned to drill 151 metres into the shore of the lake. Drilling was abandoned after ten days at a depth of 11.2 metres because sand caved in, allowing the salt water used as a drilling fluid to escape from the hole and spill on to the surface under the drilling platform.

Before the drilling rig was moved the site was covered over. Earlier about 23,000lb. of sand and gravel were loaded into 38 drums and taken out of the valley by helicopter. This was done because of possible damage the salt water might have done to the environment of the lake and the valley.

Early in January the drillers transferred their equipment to New Harbour, about five miles from Lake Fryxell at the eastern end of the Taylor Valley. They drilled into beach and delta deposits to a depth of 157.31 metres. The upper 39 metres of the hole was then reborred at a slight angle because



Mount Erebus, one of Antarctica's two active volcanoes, will be studied next summer by an international party of scientists and mountaineers from France, New Zealand, and the United States. This photograph taken from a United States Navy helicopter shows the volcano's 800ft crater into which the party, led by one of the world's leading vulcanologists, Dr H. Tazieff, will descend to study the lava composition and eruptive gases.

not enough core samples were recovered the first time. Drilling stopped because of tightness in the hole and circulation problems.

All the other projects in the New Zealand programme were completed successfully. Field projects were delayed slightly early in the season because of bad weather which resulted in operational difficulties.

ITALIAN PARTY

International co-operation was again a feature of the New Zealand programme. In addition to the United States and Japanese scientists involved in the Dry Valley Drilling Project, a party of five Italians spent six weeks in the dry valleys studying their glacial morphology, petrography, geochemistry, and micro-meteorology. Transport for the team of three scientists and two technicians led

by Professor A. G. Segre, which represented the Italian National Committee of Scientific Research, was provided by New Zealand; otherwise the party was self-supporting.

Four of the five Italians, including Professor Segre, worked with the New Zealand programme in the 1968-69 summer. When he returned to Christchurch in January Professor Segre said that no startling discoveries had been made by the party but the data collected, which would take at least a year to analyse, would add much to already known details of the valleys.

The party's studies centred on the meteorological phenomena which cause the micro-climate of the dry valleys. Professor Segre said he was impressed by the quite sharp line between bare ground and snow after a heavy snow storm on one of the valleys.

With the present international fuel crisis sledge dogs may return to favour in the Antarctic. Those at Scott Base may be put to use in the field as a replacement for motor toboggans, according to Mr R. B. Thomson, superintendent of the Antarctic Division, Department of Scientific and Industrial Research.

Early next summer three bitches and two dogs bought in the United States by the Antarctic Division will be used to improve the strain of the huskies at Scott Base. Mr Thomson says there has been too much interbreeding in recent years, and very little success with litters of pups in the last two years.

The introduction of some new young huskies to improve the strain of the local dogs was suggested by last winter's dog handler at Scott Base, Mr J. R. Bitters, when he returned to Christchurch towards the end of last year. He said that most of the huskies were between five and seven years old, and were nearing the end of their working life. Two litters were lost during the winter, and three dogs had to be killed because of old age and poor health.

Like all dog handlers Mr Bitters became attached to his charges during the 13 months he looked after them. But a dog team was responsible for an accident which resulted in his return to New Zealand. He was exercising the dogs and giving a visitor a ride on the sledge when he was caught up in the traces and dragged along the ice. The results were torn ligaments, a leg in plaster, and a trip back to New Zealand.

ARTIST'S WORK

A New Zealand artist commissioned by the Antarctic Division to sketch and paint aspects of the New Zealand research programme in the Antarctic returned to Christchurch at the end of January. Mr Maurice Conly, who had to put rocks on his paintbox to stop it blowing away, and carried a vacuum flask of hot water to thaw his brushes and water-based paints, spent seven weeks at Scott Base, Vanda Station, in the Wright Valley, the Amundsen-Scott South Pole Station, and elsewhere, and

brought back more than 30 drawings and sketches from which he will produce a selection of finished pictures in oils and other media.

Mr Conly, who was in the Antarctic during the 1971-72 season to record the work of the Royal New Zealand Air Force, and the activities of New Zealanders at Scott Base, was restricted in what he could do because the materials he worked with were so affected by the weather.

Antarctic Heat Wave

A heat wave swept the McMurdo Sound and dry valley regions of Antarctica in the first days of 1974, producing record high temperatures. New Zealand's second base, Vanda Station, on the shore of Lake Vanda, in the Wright Valley, about 80 miles west of Scott Base, had its hottest day on January 5 when the temperature reading was 15deg Celsius or nearly 60deg Fahrenheit.

McMurdo Station, on Ross Island, recorded its highest temperature on January 2 when the thermometer reached 8.3deg C or more than 45deg F. On the same day at Scott Base, two miles away, the temperature was 6.2deg, the highest recorded this summer, but a few points less than the record of 6.8deg on January 8, 1970.

The heat wave hit Vanda Station on January 2 when the temperature was 12.1deg C. The temperature soared to 13.6deg on January 3, which was the hottest day recorded since the station was established in 1970. But the record was broken two days later. Meteorological observers at the station had not recorded a temperature below freezing since mid-night on December 28.

The heat wave speeded the melting of glaciers in the Wright Valley, allowing the Onyx River to reach Lake Vanda at last. The Onyx flows for about two months of the year from the lower Wright Glacier at the eastern end of the valley to the lake, 18 miles away. This year the river was about two weeks late.

VUW EXPEDITION

Fossil Fish Discovered in Ancient Aztec Siltstone

Despite some major setbacks, caused mainly by the weather, the 18th Victoria University of Wellington expedition achieved most of its scientific activities in the Antarctic during the 1973-74 season. Members of the expedition spent from one to three months in the field, most of the work being done on the Polar Plateau. Two of the eight science students in the party worked with the international Dry Valley Drilling Project. The field season in the Shapeless Mountain area, 150 miles from Scott Base, on the edge of the Polar Plateau, was disrupted by bad weather, heavy snow, and the serious illness of two members of the party ("Antarctic," December, 1973, Page 416).

During the season eight science students worked in the Trans-Antarctic Mountains, carrying out geological and chemical studies. The party's five main objectives corresponded to the research topics of five Ph.D. students, all of whom had already spent at least one field season in the Antarctic. They were Mrs Janet Crump (leader), John McPherson (deputy-leader), Harry Keys, Philip Kyle, and Mrs Rosemary Kyle. Paul Luckman, Russell Plume, and Graham Rowe, all third-year geology students, assisted with the field work.

Mrs Crump continued her study of the Mawson Breccia, a rock about 150 million years old, consisting largely of volcanic rock fragments in a sandy matrix. The fragmentation of the volcanic rock (dolerite) and subsequent intrusion of the volcanic and sedimentary mass, may have been caused by a huge underground volcanic explosion, though that type of activity is rarely found with dolerite. The breccia was studied at Shapeless Mountain (2739 metres) and further north in the Allan Hills.

SHARK FOSSILS

The oldest rocks looked at by the group were the red and green coloured siltstones and sandstones studied by John McPherson. The Aztec Siltstone seems to have been deposited in lakes

and streams about 350 million years ago, and at some localities was found to contain well preserved fossil fish, Bothriolepis, Crossopterygians, Ctenodus (lung fish), and Ctenacanthus (sharks). The climate at the time these rocks were being formed was indicated by the development of ancient soil profiles.

Harry Keys continued systematic sampling, started last year, of salt deposits forming on exposed rock surfaces both in the dry valleys and on the Polar Plateau. This detailed mapping of salt types and their abundance may help to determine the origin and mechanisms of migration of these salts. Mineral accumulations within ice may form visible strata, as in the toe of the Taylor Glacier. These were studied and sampled at various localities.

Philip Kyle, whose area of study is the McMurdo volcanics, spent his fourth season in the Antarctic as a site geologist with the international Dry Valley Drilling Project. This work entailed logging and examining core samples from the third hole drilled on Ross Island, which penetrated volcanic material for 381 metres. Mr Kyle went south on the first flight in early September to begin his work with the DVDP.

WHITE-OUT WEATHER

During November Mr Kyle spent two weeks camped just below the crater

rim of Mount Erebu to observe volcanic activity. He was unlucky to encounter white-out conditions which prevented observation. On November 25 Dr H. Tazieff, the noted French vulcanologist, visited the crater in preparation for a joint French-New Zealand expedition next season. The expedition plans to descend into the crater to obtain fresh lava and gas samples.

Detailed sampling of Permian (250 million years) sandstones and siltstones, both for coal and microscopic flora such as pollen grains, was carried out by Rosemary Kyle. The coal-bearing strata in the Trans-Antarctic Mountains are similar to those in Tasmania, Eastern Australia, and South Africa. They can be far more precisely dated by fossil pollen than by fossil leaves.

SERIOUS ILLNESS

In November 12 the rest of the VUWAE party (except Paul Luckman who spent the entire season working with DVDP) were put in to the Shapeless Mountain area by a United States Navy VXE6 Squadron helicopter. The main Shapeless Mountain party, Ken Blackwood (D.S.I.R. field assistant), Janet Crump, Russell Plume, and Graham Rowe, experienced bad weather, very heavy snow cover, and serious illness (believed to be carbon monoxide poisoning), and so had a disrupted field season. The party was finally brought out in late December, and did some work in the dry valleys before returning to New Zealand in late January.

Harry Keys, John McPherson, and Rosemary Kyle spent two weeks at Shapeless Mountain. Then they moved to Mount Crean where better weather was encountered. On December 2 Rosemary Kyle returned to Scott Base, and the others remained until December 21 in the Skelton Neve area, visiting Aztec Mountain, Mount Metschel, Alligator Peak, and Rotunda.



Two Men Killed in Accidents

A United States microbiologist who was studying the water absorption of soil particles in the dry valley region and its microbiological significance fell 500ft to his death on the slopes of the Wright Valley on December 10. He was Dr Wolf V. Vishniac, aged 51, of the University of Rochester, New York.

Dr Vishniac and his field assistant, Dr Zeddie Bowen, a 36-year-old geologist, also from the University of Rochester, began a three-month research project for the National Science Foundation's research programme in the Asgaard Mountains, some 80 miles north-west of McMurdo Station, on November 8. Dr Vishniac was on a routine excursion from the base camp along the southern slopes of the upper Wright Valley and left a marked path on to an icefield, and fell down the slope between Mt Baldur and Mt Thor.

When Dr Vishniac became overdue Dr Bowen went looking for him. When his death was reported a United States Navy VXE6 Squadron helicopter took two New Zealand mountain climbers and the squadron flight surgeon from McMurdo Station to recover the body.

On the other side of the continent a Japanese seaman of the Maritime Self-Defence Force died on January 2 after a fall into a deep crevasse near Syowa Station on Ongul Island, off the Prince Olav Coast of Queen Maud Land. Leading Seaman Fumio Shintani, aged 23, of the crew of the icebreaker Fuji, was on a short weather research walk when he fell into the crevasse. He died after being rescued and treated aboard the ship.

The accident was the first involving a member of the crew of a Japanese support ship since Syowa Station was established in 1957. A geophysicist, Mr Shin Fukushima, who was a member of the fourth Japanese Antarctic Research Expedition, died in October, 1960.

WAIKATO UNIVERSITY

Lake Bonney salt deposits mapped by expedition

BY PROFESSOR A. T. WILSON

(Director, Antarctic Research Unit, University of Waikato)

Drilling through the ice into Lake Bonney in the Taylor Valley by the main Waikato University expedition during a survey last season indicated at least two million tons of salt below the lake bottom. In its detailed bathymetric and sediment survey the expedition discovered and mapped the extent of the very large deposit of salt.

The expedition enjoyed a most successful 1973-74 summer field season, and achieved a considerable amount of scientific work. More work was accomplished than was originally planned, and the flexibility and diversity of the field programme enabled the expedition to capitalise on weather and transport opportunities as they arose.

In the first part of the programme one party was concerned in the Dry Valley Drilling Project. It consisted of Dr Chris Hendy (geochemist), Robin Holdsworth (physics technician) and John Gumbley (sedimentology student). They went south in October with very sensitive light measuring equipment to monitor the drilling of the Lake Vanda hole. The equipment worked extremely well, and was so sensitive that it could detect people walking about on the ice even when the detector was under 12ft of ice and 230ft of water. Its purpose was to give an early warning if any mud escaped from the drilling operation. Lake Vanda has the clearest water in the world and is an important "laboratory" for various studies in solar heating and heat flow and it is important that it not be contaminated.

HEATING OF LAKE

On completion of the hole an American group was supposed to measure temperature profiles in the hole. Its equipment failed in the very saline water so the Waikato group contributed a differential thermal couple system which was grouted into the hole. This enabled it to be established that heat is

escaping downward into the lake bottom showing that the high lake temperature of 25deg. C. is due entirely to solar heating. This presumably ends the 15-year-old argument over the origin of the heating of Lake Vanda.

Dr Hendy set up a uranium dating system at McMurdo Station to date gypsum samples as they emerged from the hole. John Gumbley assisted the DVDP at McMurdo Station and later acted as site geologist at the DVDP Lake Vida hole.

The main expedition consisted of Professor Wilson (geochemist), Dr Terry Healy (earth scientist), Adrian Field (geochemistry student), John Gumbley, and Chris Reynolds (chemist and field assistant).

The major aim of the expedition was to undertake a detailed bathymetric and sediment survey of Lake Bonney in the Taylor Valley. Thirty-five holes were drilled through the ice in the Western Lobe and 52 holes in the larger Eastern Lobe. This enabled accurate bathymetric maps to be drawn and the surface sediments to be studied. It also enabled targets to be selected for deeper coring using a "pile-driving" technique. The corer was recovered using a pre-fabricated drill rig and winch.

Although the extreme salinity of Lake Bonney was known previously, the Waikato Expedition survey discovered and mapped the extent of the very large deposit of halite (common salt) occurring below the lake bottom. The halite occurs uniformly over the flat floor of the Eastern Lobe. Drilling indicated at least two million tons of salt.

Laboratory work is continuing in order to investigate the detailed nature of the sediment cores and the quality of the halite recovered from Lake Bonney. The detailed bathymetry sheds further light on the geomorphology and relative glacial chronology of the Lake Bonney-Taylor Glacier area.

The importance of Lake Bonney, particularly the smaller Western Lobe, is that its sediments record the past height of the Polar Plateau. This is because it is largely fed by the Taylor Glacier whose level is closely related to the height of the Polar Plateau.

Many samples suitable for dating were obtained. They are now being processed for uranium dating.

As the expedition was camped at Lake Bonney for several weeks, there was an opportunity for other work in the region. This was in the main geomorphological and geochemical.

A geomorphic investigation more detailed than that previously carried out by Pété was made of the area extending from the Taylor Glacier snout down the valley as far as the Nussbaum Reigel. Thermokarst studies, and fluvial geomorphology particularly of stream bifurcation were carried out.

SALTS IN SOILS

Much of the difficulty in interpreting Antarctic geomorphology and surficial geology arises from the lack of suitable datable material and well formed moraine. Initial deductions rely heavily on morphological interpretations alone. In the belief that geochemical techniques may assist to unravel the complexities of the Antarctic glacial moraine and lake problems, a continuing project has been under way to investigate the concentrations of salts in the soils on the valley

sides above Lakes Bonney and Vanda. Obviously higher lake levels would leach out the concentration of salts in the soils whereas areas not inundated by ancestral lake levels should have much higher salt concentrations.

Initial results show marked increase of salt concentrations approximately 200 metres above the lake surface of Lake Bonney. The implication is that the high "1000ft" level in the Taylor Valley is indeed an old lake level and not a sea level; that it is of the order of 6000 years old (from the amount of salt present); and that once the lake began to fall it fell very rapidly.

In continuance of the Waikato Antarctic Research Unit's interest and research into the formation and evolution of Antarctic slopes, field work was carried out on the Olympus Range. Magnificent bedrock slopes are easily accessible in the Olympus Range, and it is one of the few areas where the Richter foot-slopes are not mantled in debris.

CORES RETRIEVED

Because of a technique unsuitable for drilling in unconsolidated muds, the DVDP attempt to obtain a complete and undisturbed sediment core from Lake Vanda failed. All that was obtained from the upper two metres was a slurry of unconsolidated bottom sediment.

In view of this and the success of the Waikato drilling programme on Lake Bonney, the Waikato rig was moved to the much deeper Lake Vanda in an attempt to obtain the upper two metres of core missing from the DVDP core. Two undisturbed cores of two metres and one of 2.5 metres were retrieved. This was particularly pleasing in that it probably represents the last 100,000 years which are of great interest. These cores are now being analysed for their mineralogy, sedimentology and their implications for world climate.



B.A.S. ACTIVITIES

Rebuilt Base at Halley Bay Completely Operational

A major project in the British Antarctic Survey 1972-73 programme—construction of the new base at Halley Bay, has now been completed. This season the base, first established in 1956, and then completely rebuilt in 1967, became fully operational. Another project completed during the summer was the selection of a site on Doumer Island, near the old British base at Port Lockroy, of a new emergency airstrip as an alternative to the one previously used on Anvers Island. Use of this airstrip will enable men and stores to be landed by ships and flown south when the southern areas are blocked by ice.

Persistent sea ice around the South Orkney Islands and off the west coast of the Antarctic Peninsula limited ships' activities in the first half of the summer. Bad weather was also encountered in the South Georgia-South Orkneys area, recurrent gales alternating with dense fog. Further south, however, the weather was generally good in November and December, and some unusually high maximum temperatures were recorded.

The Royal Research ship John Biscoe arrived off the west coast of the Antarctic Peninsula in early November and called at Palmer Station to land the New Zealand-born adventurer, Dr David Lewis, who is attempting a solo circumnavigation of the Antarctic in his 32ft sloop Ice Bird. He was forced to leave the sloop at Palmer Station last winter and set off again in mid-December. He was sighted for a few days north of the Argentine Islands base in fairly difficult pack ice. Fires were lit and flares let off but there was no indication that he had seen the signals.

The Biscoe, meanwhile, had landed a party on Doumer Island, near the old British base at Port Lockroy, to reconnoitre the area for a new emergency airstrip as an alternative to the one previously used on Anvers Island. An easily accessible site was soon found, about two miles from the north-east point of the island.

Then the Biscoe tried to reach the Argentine Islands but damaged her propeller in an encounter with heavy ice in dense fog and was forced to turn back. The Doumer Island party was picked up by the two Twin Otter aircraft which had arrived at Adelaide Island from Canada in mid-October. Two of the men were taken south to George VI Sound to carry out limnological work, and two others began an airborne magnetometer survey.

HEAVY RAIN

After repairs in the Falkland Islands, the Biscoe sailed for the King Edward Point base on South Georgia where she was joined by H.M.S. Endurance. Unloading was delayed by unusually heavy rain, but when it had been completed the two ships assisted in moving stores and equipment to various centres of field work in the Cumberland Bay area. The Endurance's helicopters also helped to carry out a magnetic survey of the site for a new geophysics hut on the Barff Peninsula.

For the next two weeks the ships were engaged in transporting botanists and geologists to otherwise inaccessible localities around South Georgia and the off-lying islands. As sea ice still blocked access to Signy Island in the South Orkneys work then started on the benthic survey of the area off the north

and north-west coasts of South Georgia and the Willis Islands. In spite of gales, 13 deep sea stations were worked.

Eventually the Biscoe was able to set course for Signy Island in mid-December; by then most of the ice had broken up, but the weather was still bad and dense fog was encountered. After landing men and supplies, the ship returned to South Georgia and resumed the marine survey and the transport of field workers.

The latter included Duncan Carse who had been landed by the Endurance to reconnoitre suitable localities for filming next season. Bad weather not only prevented him from achieving his aims but also forced him to abandon most of his equipment some distance inland. Even with the help of four men from the Biscoe it was not possible to retrieve it.

GALES AND FOG

At this time gales were interspersed with dense fog and the ship laid to at Annekov Island. This pleased the botanists who were able to spend most of the time ashore. As the damaged propeller was still giving trouble, the ship then made for Montevideo and entered dry-dock for repairs at the end of January.

Meanwhile the R.R.S. Bransfield arrived at the Falklands in mid-December, on her way south. In the next two weeks she relieved the three B.A.S. Antarctic Peninsula bases, visited Palmer Station and inspected the new landing site on Doumer Island. A week (including Christmas) was spent in Marguerite Bay, and she then turned north to pick up the survey's director, Dr Richard Laws, and other summer visitors at Punta Arenas. After refuelling in the Falklands, she proceeded to Signy Island, where work was completed on a new concrete slipway. Then she continued on to South Georgia before turning south to Halley Bay.

The voyage south through the Weddell Sea was uneventful and comparatively ice-free and the ship arrived at

Halley Bay on January 27. After last year's extensive collapse of the ice-cliff, it was feared that unloading would be extremely difficult this year and impossible within about 30 miles of the base. To everyone's surprise the ship was able to moor alongside fast ice in an inlet only two miles away, where a soft snow ramp provided access up on to the ice-shelf.

Unloading was completed in four days, but the ship remained there for another 10 days to provide extra manpower for moving heavy equipment from the old (1967) base to the new complex. Most of the equipment, stores and furnishings had already been moved and most of the men comfortably installed.

Fine weather in November and December enabled the aircraft to carry out their programmes successfully. Fossil Bluff advance base and field parties were supplied and depots laid, and a combined garage and store hut was flown in and built at the bluff. Two geophysicists flew more than 5000 miles of magnetic traverses, and aerial photography was carried out in unusually clear weather on the east coast of the Antarctic Peninsula for the surveyors.

FUEL SHORTAGE

By the beginning of December the aircraft were running short of fuel, especially as stocks had been flown south in preparation for the 1974-75 field work. They had to await the arrival of further supplies in the Bransfield before resuming flights.

The 1973 survey programme for the area south of Marguerite Bay was completed by the end of January, and reconnaissance journeys were begun for the 1974 programme. Unusually good weather on the east coast of the Peninsula throughout November, enabled surveyors and geologists to complete work on the Black Coast and then move on to the Mt Andrew Jackson area at 71° 22' S / 63° 22' W.

A geophysical party south of Mt Andrew Jackson was less fortunate.

Towards the end of November it encountered bad visibility, sastrugi, rain, and temperatures up to 10deg Celsius (50deg F)! To add to the men's troubles their gravimeter was damaged, so for a while they were able to take magnetometre readings only. However, a new gravimeter was later flown to them at the Eland Mountains.

Geologists completed their work at the south-western end of the Eland Mountains east of the southern end of George VI Sound. Geologists completed their work at the south-western end of the Eland Mountains in the Clifford Glacier area to the north, and in the Seaward Mountains east of the southern end of George VI Sound. Geologists and surveyors also completed work on the Lemay Range and south-eastern Alexander Island. More work was done on the Belemnite Point cliffs in the sound and abundant fossils and some coal collected.

SPARTAN GLACIER

Glaciologists have continued working on Spartan Glacier north of Fossil Bluff. A summer party has also been measuring ice movement with a radio echo-sounder and has taken core samples for stable isotope analysis. Limnologists working in the sound have made good progress and found a number of interesting creatures in the freshwater pools.

Surveyors working in the Sound in November were surprised to encounter an Adelie penguin 100 miles from open water. It was given a ride back to Fossil Bluff on a motor-toboggan and the next day was flown to Adelaide Island where it was released.

On South Georgia, geologists and botanists have made good progress, having been greatly helped this summer by the lack of snow cover. The five-year programme of botanical landings for a preliminary survey was completed by mid-January, and three botanical parties have also been studying particular species. The reindeer population study has begun, and fur seal tagging

has been continued on Bird Island off the western end of South Georgia.

At Halley Bay, a party visited the Dawson-Lambton and Hayes Glacier areas. En route, one Muskeg tractor broke through a crevasse bridge, but fortunately no-one was injured and the vehicle was recovered the next day. Record high temperatures were recorded in the area in December.

Dr Laws, who joined the Bransfield at Punta Arenas in early January, is visiting all the survey's bases. His first ports of call were Signy Island (where he wintered in 1948 and 1949) and South Georgia (where he wintered in 1951). He continued on to Halley Bay and later was flown from there to Adelaide Island to join the Biscoe.

The Governor of the Falkland Islands, Mr E. G. Lewis, and Mrs Lewis visited South Georgia on board H.M.S. Endurance in December.

Professor D. H. Griffiths and his party in R.R.S. Shackleton, continuing their long-term detailed geophysical survey of the Scotia island arc, also called at South Georgia in December.

FAMILY AFFAIR

A Lyttelton-born mechanical engineer, who has lived in Canada for 22 years, returned to New Zealand last month for a visit during which he hoped to visit the Antarctic where his grandfather and father served with Shackleton 65 years ago. Mr M. L. Rooney's grandfather, Mr H. McGeown, and his father, Mr F. A. Rooney, were both members of the crew of the Nimrod on Shackleton's 1907-1909 expedition.

Mr Rooney wanted to fly south to see Mount Erebus. Because of the lateness of the season neither the United States Navy's Antarctic support force nor the Antarctic Division, Department of Scientific and Industrial Research, was able to help him. But he did get a glimpse of the Antarctic when he was shown a selection of colour slides at the Christchurch office of the Antarctic Division.

DEEP-WATER PORT ON AMUNDSEN SEA COAST

Plans for a deep-water port in Pine Island Bay, off the Walgreen Coast of the Amundsen Sea, and the establishment of a runway on blue ice in the Pensacola Mountains, about 500 miles from the South Pole on the Weddell Sea side of the continent, are being considered by the United States National Science Foundation. A survey of possible runway sites was made last season, and the icebreaker Staten Island made a reconnaissance of the Pine Island Bay area on its way to Palmer Station on Anvers Island, off the Antarctic Peninsula.

Transport of supplies for Antarctic operations through South America is also under consideration. The use of the runway at the Argentine Vice-Comodoro Marambio base on Seymour Island, off the Antarctic Peninsula, has been discussed with the Argentine authorities. But Captain A. N. Fowler, commander of the United States Navy's Antarctic support force, says that movement of supplies through South America will not diminish the traditional route from Christchurch to McMurdo Station. The Amundsen-Scott South Pole Station, the largest inland base, is most easily reached from McMurdo Station.

United States summer operations in Antarctica ended on February 22. This winter there will be 161 men and two women in isolation on the continent until early in October. There will be 131 Navy men at McMurdo Station, and 13 at the Amundsen-Scott South Pole Station. Thirteen scientists will work at McMurdo Station; eight at the South Pole Station, four at Siple Station, at the foot of the Sentinel Mountains in Ellsworth Land, and seven at Palmer Station.

Construction of the new geodesic dome complex to replace the old South Pole Station was the main logistic accomplishment of last season. Work began on November 7, and the station was 95 per cent completed by February 7. Navy Hercules aircraft of VXE6 Squadron flew more than two million

pounds of cargo to the construction camp, and the aircraft flew 210 missions to the South Pole.

Because all heating and power is provided by oil in United States bases, the fuel crisis caused restrictions. This season it is hoped to make a saving of 30 per cent by limits on heating and lighting, and not letting vehicle engines idle. Fuel for the year cost three times as much as in previous years, and last season the tanker Maumee delivered only $5\frac{1}{4}$ million gallons instead of the customary six million. But the storage tanks at McMurdo Station hold nine million gallons at present, and provided world fuel prices do not rise to prevent next summer's annual delivery, refuelling will then be needed only every two years in the future.

STORM DELAYS

Paralysing storms that lasted for days at the beginning of the season delayed the arrival of United States Air Force Starlifters which brought hundreds of men to McMurdo Station to begin their work in Antarctica. The ice runway at Williams Field was quickly reopened after the storms, and the Starlifters made 32 flights from Christchurch during the summer. Royal New Zealand Air Force Hercules aircraft made nine support flights. By the end of the season the hardworked VXE6 Squadron aircraft had flown 23 times to Siple Station, and made 22 flights to the

surface camp at Byrd Station, and 25 other flights in support of scientific activities.

These flights included resupply flights to the Ross Ice Shelf Project's base camp 400 miles out on the shelf, reconnaissance flights to the Pensacola Mountains, and flights to the Soviet Vostok Station. A photographic reconnaissance survey flight was made to Dome C west of McMurdo Station for a preliminary study of the area as a possible future location of a field camp for glaciological studies. Paul-Emile Victor, director of Expeditions Polaires Francaises, and Colonel Jacques Trainneau, of the French Air Force, were on the flight as observers.

Squadron helicopters flew about 988 hours in the McMurdo Sound area. All operations stopped on February 4 and the helicopters were put into storage for the winter.

Byrd surface camp was reoccupied on November 25, and was manned by 13 men to refuel aircraft on the way to Siple Station, and to serve as an emergency landing field. On November 30 Siple Station, the National Science Foundation's first fully civilian manned station in Antarctica was reopened, and three scientists and a doctor who had been there since early in February last year were relieved. On December 11 the National Science Foundation took operational control of Palmer Station, which has been run by the Navy for ten years.

McMURDO STATION

Nearly 200 scientists passed through McMurdo Station where they gathered equipment and supplies in preparation for their research work in the laboratories and in the field. Navy Seabees built an addition to the station's diesel power plant, and two new 500-kilowatt generators were installed. There are now six 500-kilowatt generators available, the addition being needed to make up for the loss of power from the nuclear power plant which is being dismantled and removed.

Three traverses were completed

across the McMurdo Sound sea ice to the Marble Point area to place in position equipment and fuel for later use by the Dry Valley Drilling Project. These were flown later by helicopter to several scheduled drilling sites.

SHIP OPERATIONS

Four ships were included in the Antarctic task force last season. They were the United States Coast Guard icebreakers Glacier and Staten Island, the cargo ship Private John R. Towle, and the tanker Maumee. Between December 30 and January 7 the ice-breakers cut a 17-mile channel through the ice in McMurdo Sound for the ships to reach Hut Point.

On January 19 the Private John R. Towle became the first ship to dock successfully at Antarctica's only artificially developed ice wharf. She was manoeuvred through brash ice in Winter Quarters Bay with the help of the Staten Island. She unloaded 37,923,201 pounds of supplies and food, and returned on February 14 with another 4316 tons of cargo, some of it for the winter party at New Zealand's Scott base.

In the late afternoon of January 26 the 16,000-ton Military Sealift Command tanker Maumee was eased alongside the ice wharf. She discharged 5½ million tons of fuel by the evening of January 28, and left the wharf, being assisted with a tow line to her stern from the Staten Island.

As the Maumee cleared the harbour her stern came against the fast ice, driving the rudder hard left past its stops, and causing severe damage to the steering mechanism. Both ships' crews, assisted by men from McMurdo Station, made repairs that enabled the tanker to proceed at 8½ knots under her own power to Wellington where she arrived on February 12. She was escorted by the Staten Island, which was relieved by the Glacier on February 7, so she could return to McMurdo Station to await the return of the Private John R. Towle.

Antarctica's man-made ice wharf where the ships now moor, is a giant ice cube, 650ft long, 200ft wide, and 25ft to 28ft thick, floating in Winter Quarters Bay. It was built by 156 men who spent last winter at McMurdo Station. They began work in March and finished in October.

Last season nearly 80 men were involved in the final preparations of the ice wharf for the arrival of the ships. To make the face of the wharf safely vertical for the docking of the ships, two-inch holes spaced 18 inches apart were drilled through the annual ice along the front of the ice pier. It was hoped that the Staten Island would be able to break the sea ice away from the giant cube leaving an even facing.

Unfortunately the ice cube developed cracks running the entire width at one end. Bollards were placed in the wharf, however, and a network of steel cables braced it to the shoreline. Small explosive charges were then used to break off underwater ice pinnacles jutting out where they would hinder the docking of the ships.

In spite of the cracks in the wharf it was fully successful as a safe facility for unloading ships. By January 17 it had been covered with an eight-inch layer of lava dirt, and a bridge had been constructed for trucks to drive on and off.

RUBBISH REMOVED

Towards the end of last season 24 Navy and civilian volunteers were flown by Navy helicopters to Marble Point where they spent three days clearing up in the dry valley area. They first tore down abandoned huts, then gathered the strewn barrels and other debris. About 15 tons of rubbish were lifted out of the valleys during the first two days.

Some usable timber and fuel barrels were stacked at Marble Point for transport later by sled traverse back to McMurdo Station in the winter. Most of the bio-degradable material was piled up in the nets and lifted by helicopters to deep water off the coast.

Record high temperatures were recorded at Antarctic stations during the summer. On January 2 McMurdo Station established a record high temperature of 47deg. Fahrenheit. About 840 miles inland the South Pole Station temperature rose to minus 2deg. F. on January 11.

On January 5, a record high temperature of plus 8deg. F. was recorded at the Soviet Vostok Station.

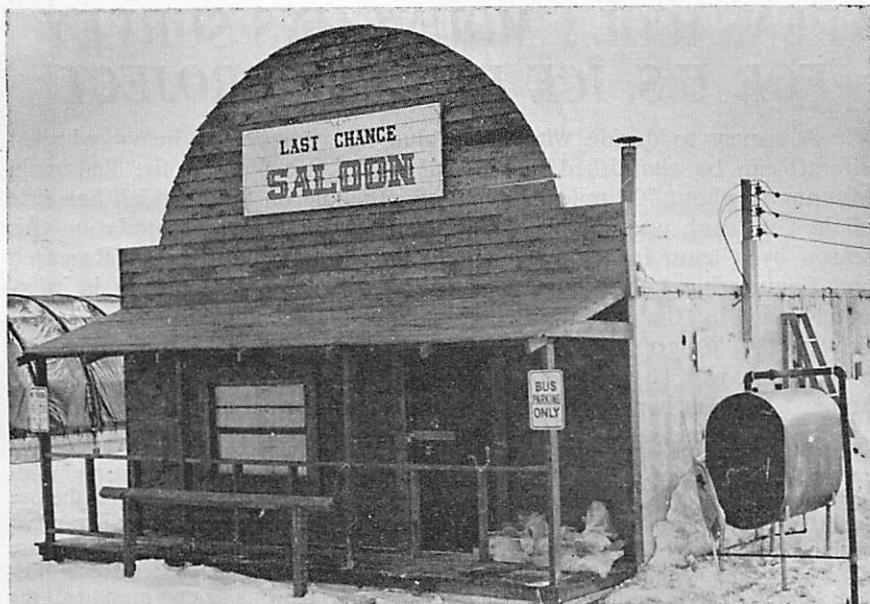
As a result of the warm, sunny weather, the roads at McMurdo Station, the cargo handling area, the aircraft and vehicle parking lots, the taxiways, and the runways of the ice airfield deteriorated rapidly towards the end of December. By January 2, all the buildings on sledges used for aircraft servicing were dragged up on the ice shelf for continued skiway operations from Williams Field until the season ended.

EXCHANGE SCIENTISTS

The international exchange of information through science will continue this winter. An American scientist, Robert Flint, will winter at the Soviet Vostok Station and Dr Sergei Abakumov, a Soviet geologist, will be at McMurdo Station. Also at McMurdo Station will be a Polish biologist, Dr Stanislaw Rakuse-Suszczewski, who will work with two American women scientists Dr Mary McWhinnie and Sister Mary Adele Cahoon.

Flint, who went to Vostok Station on January 2, is an American upper atmosphere physicist from the National Oceanic and Atmospheric Administration at Boulder, Colorado. He will operate United States instruments to learn more about the upper atmosphere. The results of his observations will be shared with Soviet scientists.

The United States will have two scientists winter at Australia's Casey Station doing a satellite tracking project for the United States Geological Survey. They are David L. Schneider, from the Geological Survey and Henry Edwards, from the University of Texas Applied Research Laboratory at Austin.



This "Last Chance" saloon is not in Texas or Arizona, but at the South Pole. Men of the United States Navy's Mobile Construction Battalion 71, who have been rebuilding the Amundsen-Scott South Pole Station, used it as a recreation centre for three months this season. The 146 Seabees built the saloon in their spare time last year, using scrap materials, wooden crates, and plywood.

U.S. Navy Photo

Navy Helicopter Recovered

A United States Navy VX-6 Squadron helicopter damaged in a storm at Cape Crozier last November was towed back to McMurdo Station early in January on a 20-ton sledge pulled by a D8 tractor. The helicopter was left roped down last year because of a gearbox fault. When a party returned after the storm to repair the fault it was found that winds blowing at a speed of more than 100 miles an hour had overturned the helicopter, damaging the rotor system and fuselage.

Before the helicopter was recovered an air and ground survey was made to find the best route back to McMurdo Station, 50 miles away. The tractor hauling the sledge, the recovery team of five, and a vehicle from Scott Base, left

McMurdo Station at 2.30 p.m. on January 9 and reached Cape Crozier at midnight. The party left Cape Crozier at noon on January 11 and arrived back at McMurdo Station at noon on January 12. Last month the helicopter was shipped back to the United States in the Private John R. Towle for repairs.

RUGBY GAME ON ICE

American sailors and scientists have played their brand of football at the South Pole, and the New Zealanders at Scott Base have staged annual inter-island Rugby fixtures. On January 12 an American Rugby team came close to beating the New Zealanders at their national game in a match played on the Ross Ice Shelf about a mile out in front of Scott Base. The score was 4-4.

PENSACOLA MOUNTAINS SURVEY FOR U.S. ICE RUNWAY PROJECT

A survey to decide whether a blue ice runway for heavy 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, was completed for the National Science Foundation this season by a team from the United States Army Cold Regions Research and Engineering Laboratory. The National Science Foundation is interested also in the possibility of a deep-water port in Pine Island Bay on the Walgreen Coast of Marie Byrd Land, and a reconnaissance of the area will be made by the United States Coast Guard icebreaker Staten Island on her way from McMurdo Station to Palmer Station.

Establishment of a runway in the Pensacola Mountain would provide a staging point for a supply route from South America. From such a base ski-equipped Hercules aircraft could distribute cargo to Siple Station, Palmer Station, and the Amundsen-Scott South Pole Station. Mr Austin Kovacs, leader of the team which explored three possible sites for a runway, said on his return to Christchurch that its establishment would achieve a saving of about \$2 million in the Antarctic support programme's budget.

THREE SITES

Three prospective sites for a runway were selected last season but the survey could not be made because of the shortage of Hercules aircraft. This season Mr Kovacs and his party of three, including a geologist, were flown into the area by a United States Navy VX-6 Squadron Hercules with their two tracked vehicles, and spent ten days there.

Because of bad weather in the mountains Mr Kovacs and his party lost some of their equipment when their articulated tracked vehicle overturned on a sastrugi-covered steep slope and had to be abandoned. They had to look at two sites with the back-up vehicle.

Mr Kovacs says the first site at the base of the north side of Mount Lechner has some possibilities. The ice is perfectly flat but it contains some rolls in

it which are unacceptable. A site on the north side of Rosser Ridge at the north end of Cordiner Peaks, where the ice has a one-degree slope, contains a series of sever depressions, and will require further investigation. Extensive crevassing and blowing snow prevented the party from examining the third site in the Davis Valley on the north side of the Dufek Massif.

As a result of this survey Mr Kovacs considers that other parts of the area should be investigated before any decisions are made. He believes also that a reconnaissance of the region should be made by an aircraft rather than a field party.

ICE COVER

The field study was planned to reveal the state of the ice cover at each site, and to provide information as to the type of terrain modification and equipment needed to prepare each site for use by wheeled aircraft. The establishment of a major runway like Williams Field at McMurdo Station is unlikely to be considered for at least two years.



New Station at South Pole Ready Next Summer

Next winter 16 scientists will live at the South Pole in the new Amundsen-Scott South Pole Station, a complex of buildings housed beneath a geodesic dome 160ft in diameter and 52ft high, and a corrugated aluminium arch nearly 800ft long. The old station, established 17 years ago, and now buried under 35ft of snow which is slowly crushing its underground caverns and tunnels, will be occupied for the last time this winter because it is rapidly becoming unsafe.

Last month the United States Navy, which has been responsible for building the new station over the last three summer seasons, officially handed over the project to the National Science Foundation. When the next summer season begins at the South Pole in November a civilian construction crew will spend two months making the complex ready for occupation. Less than one-third of a mile from the geographic South Pole, the station will support up to 32 men in future summer seasons, and 16 in the winter.

This new station will become the National Science Foundation's third scientific research station in Antarctica to be manned entirely by civilians. The first was Siple Station, at the foot of the Sentinel Mountains in Ellsworth Land, and less than 1,000 miles from the Pole. It became a civilian station in January last year, and Palmer Station, on Anvers Island, off the Antarctic Peninsula, followed in December.

Seabees of the Navy's Mobile Construction Battalion 71 started construction of the new station, about a mile from the old station, in November, 1971. Construction of the geodesic dome and a small section of the corrugated aluminium arch began in November the next year. Despite constant sub-zero temperatures, high winds, and delays in delivery of building materials, the dome, designed to protect buildings from winds and drift-

ing snow, was completed on January 5, 1973.

In the 1973-74 season 140 Seabees, assisted by 30 civilians, worked for four months to complete the station. The remaining sections of the arch, which runs at a tangent from the dome, were built. Beneath it were placed vans similar to those used in modular housing construction. Three vans were also placed within the dome, and second stories were built above each. The Seabees also built under the whole station a tunnel 8ft high and 4ft wide to carry power, telephone, heat, water, and sewage lines.

Under the dome are three buildings, each two stories high. They house science facilities, living quarters, a library, a store and recreation hall, the dining room, and a conference room. Each van has interior panelling and wall to wall carpet. In the dining room there is scarlet carpet on the floor, and coach-style lamps adorn one wall. Imitation rustic beams hide the conduit and water piping, and the fluorescent overhead lighting is softened by translucent glass panels. The windows are of brownish yellow glass.

Under the arch are vans housing, a vehicle workshop and a gymnasium, the station power plant, a dispensary and a research laboratory. Set away from the station under an arch separated by a snow wall 8ft high is a fuel storage area to hold 225,000 gallons of petrol, diesel fuels, and jet fuels.

Other Antarctic stations have sunk slowly because of heat from the buildings melting the snow upon which they are built. To check this at the new station the dome and the arch will not be heated. Outside air will be pumped through the station to keep the area inside the dome and the arch almost the same temperatures as those outside.

Power for the station's lighting and electrical equipment will be provided by a 250-kilowatt generator. There are

three such generators which will be used in rotation. Their cooling system will heat the station. A heated glycol solution will be pumped from the cooling system into heat exchangers in each van. The heated solution will also melt snow to provide fresh water.

From the new Amundsen-Scott South Pole Station the men who live there will be able to gaze out on a featureless landscape—not really land but nearly 9,000ft of ice.

DR LEWIS MAKES LAST CALL AT BASE IN SOUTH ORKNEYS

Dr David Lewis, the 56-year-old New Zealand-born adventurer, who is attempting to circumnavigate the Antarctic Continent single-handed in his 32ft steel sloop Ice Bird, reached his last landfall, the British Antarctic Survey base on Signy Island in the South Orkneys, on January 5. He left Signy Island on January 7, and expects to complete the third leg of his 17,000-mile voyage in May.

Since Dr Lewis sailed from Palmer Station, the United States base on Anvers Island, off the Antarctic Peninsula ("Antarctic," December, 1973, page 441) reports of his progress have come through links with amateur radio operators. He is unable to transmit radio messages because his transmitter was damaged by immersion in salt water when the Ice Bird capsized on the voyage south from New Zealand last year, and could not be repaired.

Dr Lewis left Palmer Station on December 5 last year after his sloop had been refitted, using makeshift materials, with the help of the men at the base. He intended to call at the B.A.S. Argentine Islands base north-east of Palmer Station but the Ice Bird was caught in pack ice for three days. Dr Lewis used his engine to free the sloop without success. When the pack began to move north the Ice Bird was freed.

Then Dr Lewis sailed north through Lemaire Channel and finally reached the Argentine, Almirante Brown,

in Paradise Bay. The Ice Bird ran aground, but the Argentinians came to the rescue, and also helped Dr Lewis to repair the self-steering gear. He left on December 19 but became stuck in the ice again on the attempted run south. Finally he sailed through Bransfield Strait and reached King George Island in the South Shetlands.

Because of the ice Dr Lewis could not get ashore and spent Christmas Day alone off the island where there are Russian and Chilean bases. On Boxing Day he continued his voyage to Elephant Island. There he encountered heavy fog, icebergs, and a ferocious storm with winds up to 45 knots.

On the voyage to Signy Island Dr Lewis ran into more trouble. The island was surrounded by grounded icebergs, and navigation was extremely difficult. For two days Dr Lewis had no sleep while he tried to find the proper landing site. He came ashore finally about mid-day on January 5 and after a post-Christmas celebration slept for 24 hours.

AUSTRALIAN NEWS

Loss of helicopter affects work south of Mawson

Loss of a helicopter in the southern Prince Charles Mountains of MacRobertson Land on January 17 caused some contraction of the Australian National Antarctic Research Expedition's 1974 summer programme in the area south of Mawson. The tellurometer traverse to the Grove Mountains had to be terminated at an un-named nunatak in about 72° 50' S 72° 30' E, two-thirds of the distance to the mountains. During the traverse, the party established another ice marker, which will be remeasured at a later date to establish ice movement.

Once again the Nella Dan provided the main support for ANARE parties. She relieved Macquarie Island in November, and then took the relief parties to Mawson and Davis, returning to Fremantle on January 25. On her second voyage she was expected at Melbourne on March 16. The Thala Dan relieved the French base Dumont d'Urville in January, and returned to Melbourne on February 15 after calling at Casey.

A report from the Antarctic Division of the Department of Science says that the Nella Dan left Melbourne on December 14 last year and reached the pack off Mawson on December 29. Men and cargo were ferried ashore by a fixed-wing aircraft and three helicopters by January 1.

Moore Pyramid camp, 316 kilometres south of Mawson, was reactivated on January 2 and Mount Cresswell camp, 564 kilometres from Mawson, was occupied on January 5. Field operations began the next day.

The re-survey of 11 ice markers established in 1972 to determine ice velocities was completed by January 20. In addition geologists, a botanist and a geophysicist visited numerous rock outcrops. By January 25 ice thickness and elevation measurements had been completed and aerial photography began.

Mount Cresswell camp is expected to be closed by February 1. Some of the equipment will be deposited there, but most of it will be taken out by tractor train for use elsewhere in later seasons. Moore Pyramid camp is expected to be closed on February 7.

ANARE research programmes for 1974 covered the usual wide variety of scientific disciplines. The main fields of investigation were geodesy and cartography, bathymetry, geology, meteorology, glaciology, geomagnetism and seismology, upper atmosphere physics; cosmic rays, biology and medical research.

The summer glaciology programme from Mawson was planned to continue and extend the programme started in 1972, to determine the total ice mass budget around the 1500-2000 metre contour of the Lambert Glacier-Amery Ice Shelf drainage basin. About 40 hours of flying time was devoted to ice thickness and elevation measurements using the Antarctic Division's 100 MHz ice radar in the Pilatus Porter aircraft.

The main feature of the glaciology programme at Casey was deep-core drilling and subsequent logging of bore-hole movement. A traverse 200 kilometres inland from the summit of Law Dome remeasured georeceiver sites established last year and established new sites 50 kilometres east of the 1973

sites. Thermal probes were tested during the traverse.

In the Mawson region, the Prince Charles Mountains summer party carried out block aerial photography from 20,000ft using the Pilatus Porter aircraft. Surveyors co-operated with glaciologists in the re-measurement of ice stations established in 1972. Other survey tasks included determining barometric heights and spot photography of existing tellurometer stations.

After the work in the Prince Charles Mountains ended, an aerial reconnaissance was planned, if time allowed, along a probable route for an over-snow traverse from Depot A south of Mawson to Enderby Land. In addition, vertical aerial photography and geodetic survey was carried out from Mawson.

SURVEY WORK

The summer party at Casey was engaged, with the aid of helicopters, in survey work and checking, especially in relation to neighbouring islands and the nearby area of Casey station. On Macquarie Island, two officers of the Tasmanian Lands Department did preliminary work for mapping the island.

Biological studies occupied a large part of the summer programmes for Mawson, Davis, Casey, and Macquarie Island. Some of these will be continued this winter.

This summer a biologist in the Prince Charles Mountains party visited as many rock outcrops as possible for study of lichens and mosses. This study was continued at Mawson and combined with surveys of Antarctic petrels and other birds, and a search for elephant seals. Throughout the year surveys will be made of Cape petrels, Emperor penguins and seals. A programme of seal tagging will also be carried out.

A new biological laboratory was built at Davis this summer and put into service on completion because important aspects of the biology programme were concentrated in the first two months after the summer party arrived. This programme included collections of lichens and mosses, a biological survey

of Long Peninsula, a census of elephant seals, and branding, tagging and marking. Giant petrels were banded and Weddell seal pups were counted and tagged.

Marine sampling stations were taken offshore and in Long Fjord. Sampling was done by boat and will be continued through ice-holes this winter. Lakes of different salinity were sampled and a survey of free-living arthropods made.

At Casey, Nelly Island was visited and a census made of giant petrel chicks, which were banded. Peterson Island was also visited and elephant seals counted and measured.

On Macquarie Island a study of cats, rabbits and birds will continue this year. Banding programmes will include giant petrels, the light-mantled sooty albatross and the wandering albatross. A study will be made of the social status of breeding elephant seal bulls and a census made of fur seals.

RABBIT RESEARCH

Various projects co-ordinated by the Tasmanian Advisory Committee on Macquarie Island include botanical studies and the nesting ecology and behaviour of the Macquarie Island shag. An officer of the Tasmanian National Parks and Wildlife Service will spend about 15 months on the island to continue research into rabbit eradication.

Other disciplines covered in the summer and winter research programmes, and the places where observations will be made are:

Bathymetry—Ocean soundings south of 60°S, towards Mawson and Casey, by the relief ships until their arrival at destination points. Soundings on the approaches to Macquarie Island.

Geomagnetism and Gravity—Magnetic observations at Mawson and in the field out from the station. Gravity observations at survey stations and ice markers. Magnetic observations at Macquarie Island.

Seismology—Earthquake recording at Mawson and Macquarie Island by a short-period vertical component seismograph.

Upper Atmosphere Physics—Auroral studies at Mawson, Davis, Casey and Macquarie Island to investigate magnetic sub-storms. Ionospheric soundings at Mawson and Casey to determine apparent heights and penetration frequencies of main ionosphere regions.

Cosmic Rays—Cosmic radiation studies at Mawson to observe time variations recorded to investigate interplanetary and galactic phenomena.

Geology and Geomorphology—Detailed geological mapping of selected areas in the Prince Charles Mountains. Weathering and slope erosion studies

at Davis during the year. Studies on Macquarie Island of marine magnetometer profiles, palaeomagnetic investigations, geomorphology of the lakes and the ice-cap problem, and erosion-revegetation patterns.

Meteorology—Surface synoptic observations and upper wind measurements at Mawson, Davis, Casey and Macquarie Island. Radiation measurements and atmospheric radon observations at Mawson, and additional observations of nacreous and noctilucent cloud. Macquarie Island will add ozone measurements to the other work common to all four stations.



Scullin Monolith, one of the most impressive features in the Australian sector of Antarctica, is a crescent shaped rock facing the sea west of Torlyn Mountain on the Mac-Robertson Coast in about 67° 47' S—66° 43' E. Sir Douglas Mawson landed on the rock on February 13, 1931, when he was leader of the British, Australian, and New Zealand Antarctic Research Expedition (B.A.N.Z.A.R.E.) and named it for the Australian Prime Minister, James Henry Scullin (1929-31). Norwegian whale catchers exploring the coast also charted the rock, and named it Mt. Klarius Mikkelsen for the master of the catcher Torlyn. The highest peak of the monolith is now Mikkelsen Peak (1550ft).

Australian Antarctic Division Photo — Knowles Kerry

Davis Station Rebuilding

Australia's Davis Station on the Ingrid Christensen Coast will be rebuilt in stages over the next five years at a cost of about \$800,000. This work is part of a rebuilding programme for the ANARE bases on the continent which began at Casey Station in 1969.

Davis Station was built in 1957 as a weather station and housed four men. This year there are 14, and the station is the base for the ANARE biological research programme.

Reconstruction will be on the existing site, and the first building, a biology laboratory, was completed this summer. Unlike Casey Station, where all the buildings are inter-connected, the new Davis Station will have three basic buildings.

HELICOPTER HITS RIDGE

Two members of an ANARE summer party in the southern Prince Charles Mountains were involved in a helicopter accident on January 17. The pilot, Mr Colin Scott, was not hurt when the helicopter hit a snow ridge but his passenger, Mr Andrew Turk, had his left arm crushed.

Mr Turk was brought back to Mawson Station, which is about 930 kilometres from the scene of the accident. An X-ray examination showed that no bones had been broken in the arm, and Mr Turk was able to return to the field on January 23.

Messrs Scott and Turk were flying from Mount Newton to a rock outcrop about 70 kilometres to the south to carry out a tellurometer tie between the outcrop and Wilson Bluff. They encountered a severe downdraft from which the helicopter was unable to climb out. Mr Scott tried to turn towards a lower, safer area but the helicopter hit a snow ridge and was damaged.

New Australian officers

A farm management consultant, a former British and Indian Army officer, a soil conservationist, and an electrical engineer, have been appointed as officers-in-charge of the Australian National Antarctic Research Expeditions' stations for 1974. One of them, Mr David John Luders, who will be in charge at Mawson, held the same post at Casey in 1972.

Mr Luders, who is 30, comes from Orange, New South Wales. He holds a B.Sc. degree in agriculture from Sydney University, and is a former chairman of the membership board of the consultants' section of the Australian Institute of Agricultural Science.

Mr Paul Varma, of Brunswick, Victoria, who will be in charge at Casey, is 49, and has been in Australia for six years. He served for 25 years with the British and Indian Armies and the United Nations forces in Britain, West Germany, Burma, India, Tibet, Palestine, and Cyprus.

Mr Douglas Charles Blandford, officer-in-charge at Davis, is 32, and comes from Wellington, New South Wales. He has been a soil conservationist with the Department of Conservation, New South Wales State Government, since 1966. Mr Blandford holds a diploma in agriculture from Hawkesbury Agricultural College, and a B.A. degree in geology from Macquarie University.

Mr David McKenzie Sharpe, officer-in-charge at Macquarie Island, is 42, and comes from Mount Beauty, Victoria. He is a generation engineer with the State Electricity Commission of Victoria. Mr Sharpe gained a diploma in electrical engineering at Caulfield Technical College, and after experience in England, he took charge of the generating section of the hydro-electric station at Kiewa, near Mount Beauty in the Australian Alps.

EXPEDITIONS FRANCAISES

French Plans for More Air Support in Adelie Land

French participation in the proposed international Antarctic air transportation system, and the use of air support for scientific activities in Adelie Land, are included in the future plans of Expeditions Polaires Francaises. Late in January the director, Paul-Emile Victor, and Colonel Jacques Trainneau, of the French Air Force, who has been working for the last 15 years on Antarctic air support problems, flew to McMurdo Station to discuss air operations with officers of the United States naval support force, and what the French could contribute to the international airbus system, which could be operated by pooling and common scheduling of aviation resources.

This season the French Air Force Alouette II helicopter, which provides the only air support at Dumont d'Urville, was used to make a topographic survey in preparation for building a runway and access roads near the base. Before he left Christchurch for McMurdo Station Paul-Emile Victor explained that he and Colonel Trainneau would discuss with the Americans the question of putting in a runway on ice or on land, and the problems of maintenance, staff, and landing on the ice-cap.

There are several possible sites for a runway on the ice about 20 to 40 kilometres from Dumont d'Urville, and one on land near the base. Gouverneur Islet near l'Ile des Petrels could take a 600-metre runway which would accommodate S.T.O.L. aircraft. But to provide an ice runway for larger aircraft would involve major construction. These problems are being studied by Colonel Trainneau, who went to Heard Island in 1966 with an Australian expedition to investigate the establishment of a landing strip there.

One aircraft which could be used for air support in the Antarctic, and named by Paul-Emile Victor, is the Breguet 941S S.T.O.L. It is an unpressurised cargo-passenger transport with four turbo-prop engines, and can carry

vehicles or 57 passengers. Like the Hercules it has a rear loading ramp, and is equipped to air drop heavy loads. With a maximum payload it has a range of 620 miles, and can take off in a distance of 655ft. To land it takes 345ft to 820ft. Only four of these aircraft are in use at present.

With a larger long-range aircraft capable of landing on the ice-cap the French could contribute to the international airbus system, and also fly expeditions to Adelie Land through Christchurch and McMurdo Station. At present expedition parties fly to Australia, and then are transported to Dumont d'Urville with their equipment by the Thala Dan.

For operations from ice runways the Transall C160 is under discussion, according to Paul-Emile Victor. A medium-range heavy military transport with turbo-prop engines, it is used by the French, German, and South African Air Forces, but has not been tested on skis. The standard version has a rear loading ramp, can carry vehicles, tanks, and tractors, and has a maximum payload of 35,270lb. With its normal payload of 17,640lb it has a range of 2832 miles, takes off in distances of 2067ft to 2600ft, and lands in 1160ft to 1903ft. The range is reduced to 730 miles with maximum payload.

French scientists are likely to resume their glaciological traverse across Wilkes Land to the Soviet Vostok Station either next summer or the year after. When he was at McMurdo Station Paul-Emile Victor discussed the International Antarctic Glaciological Project in which France, the United States, the Soviet Union, and Australia are concerned, with the National Science Foundation and the United States naval support force.

The two-year, 2000-kilometre traverse from Dumont d'Urville should have been completed early in 1973, but difficult terrain and bad weather forced the second leg to be abandoned. Sastrugi 5ft high and very rough badly battered the five tracked vehicles, and temperatures remained between minus 35deg and minus 45deg Centigrade. Rather than take any risks the traverse party returned to its base. The vehicles were shipped back to France for repair and overhaul.

When the traverse is completed French scientists plan to investigate Dome C, a sub-glacial dome located about 400 to 500 kilometres south of Vostok. A deep drilling project is being considered to establish the size of the dome and map it for comparison with a similar dome discovered in Greenland.

This season the 24th expedition left France by air for Australia on its way to Adelie Land 25 years after the first French Antarctic expedition sailed from Brest aboard the Commandant Charcot on November 26, 1948. This expedition, headed by Robert Guillard, consisted of 47 men, including 27 of the 35 who are wintering at Dumont d'Urville, and the summer party of 20 which returned to France this month.

Members of the expedition went to Hobart to join the Thala Dan, which earlier left Le Havre with the Alouette II helicopter, a hydrographic runabout, supplies, and scientific equipment for use in the nine laboratories at Dumont d'Urville. The Thala Dan called at Dumont d'Urville again on January 15 during its trip from Melbourne to relieve the ANARE Casey Station.

Civil engineering work at Dumont d'Urville during the summer included reconstruction of a building damaged in July last year, the installation of a 15,000-litre fresh-water tank—the second at the base—and the installation of the ninth 50,000-litre diesel fuel tank. Bathymetric soundings were made off l'Île des Petrels in preparation for the construction of a dock which will simplify the task of unloading heavy equipment.

Scientific work included core drilling to a depth of 300 metres into the ice-cap four kilometres from the coast. This was done to date successive snow layers by an isotopic method, measure temperatures, obtain core samples, and determine the rate of ice movement in relation to markers on the island. Two-thirds of the core samples were stored on the spot, and seven to eight cubic metres were brought back by three scientists from the glaciology laboratory at Grenoble.

REAL CHRISTMAS TREE

Americans at the Amundsen-Scott South Pole Station celebrated Christmas with a real Christmas tree—a 4ft fir from California—instead of the artificial trees used in past years. They were visited also by not one but four Father Christmases.

The world's most southern Christmas tree was flown to McMurdo Station in a sealed plastic bag by a United States Air Force Starlifter. A Navy VXE6 Squadron Hercules then flew the tree to the Pole.

Father Christmas in quadruplicate brought cheer to 175 scientists, sailors and construction workers not in the traditional reindeer-drawn sledge but with the aid of a Hercules aircraft and parachutes. Four members of the para-medical rescue team tested new red jump suits, and then decided to play Father Christmas. They jumped from the Hercules at a height of 12,000ft.

SANAE REPORTS

Grunehogna will be occupied by team of six this winter

Grunehogna, the geological base in the Ahlman Ridge mountain range, 215 kilometres south of Sanae Base in Western Queen Maud Land, will be occupied this winter by six men from the SANE 15 team under the leadership of Mr H. P. Barrand, a radio echo sounding technician, who will carry out field work in 1974. SANE 14 ended all its field activities when the party which wintered at Grunehogna last year reached Sanae Base on December 31. The team was expected to return to Cape Town in the research ship RSA about February 20 after a very successful year in the Antarctic.

December and January were very busy months at Sanae Base because the old team was getting everything in order for the arrival of SANE 15 which departed from Cape Town on January 5 as scheduled. The first pack ice was encountered on January 17. Fortunately it was so scattered that the RSA could steam through it in four hours. Unloading was done at Tottan Bukta and the ship was discharged in two days.

During the take-over period the maintenance team of the Department of Public Works attended to the base as usual. New equipment was also installed. This included riometers for the cosmic rays programme and an image intensifier television system for the programme on whistlers and micro-pulsations.

Various new and overhauled vehicles were also taken south to Sanae Base. This included a new D4 Caterpillar tractor with a dozer blade and Muskegs fitted with six-cylinder Deutz diesel engines and newly designed cabs. Initial tests indicated that the modifications should be successful and beneficial to field parties.

At Gough Island a high pressure system towards the end of January caused fair weather lasting for just

over a week. This was enjoyed by everybody and resulted in many walks away from the base. Unfortunately the summer period with its smaller rainfall figure also brought its problems. Quite a few excursions had to be undertaken to the little dam approximately 1.5km away from the base as air locks blocked off the water supply to the base. Strange as it may sound, water restrictions had to be imposed on January 21 when the flowing of the stream stopped completely. The next day one of the meteorological technicians celebrated his 21st birthday—as dry as a bone!

The biologists who visited the island during November have almost completed their reports and these will then be considered by the South African Scientific Committee on Antarctic Research (SASCAR).

The team at Marion Island is experiencing one of the busiest years in history as far as visiting ships are concerned. Usually the island is only visited once a year by the RSA, i.e. during April and May. For the last couple of years the French were also kind enough to call at the island during December-January with provisions and biologists. A visit by Russian ships was reported in "Antarctic" (December, 1973).

The RSA last year arrived at the island during late November for the third time to supplement the dwindling fuel supply and land three more members of the biological team. The biologists are Messrs V. R. Smith and N. J. M. Gremmen who are members from the research group of the University of the Orange Free State. Mr G. D. Anderson, an assistant to Mr P. R. Condy who is conducting research on seals, also arrived on the island.

The next visit was early in January when the French vessel Marion du Fresne anchored at the island with

cargo and the remainder of the biologists on board. The newcomers were Messrs O. R. Kok and R. J. Anderson (from the University of the Orange Free State group) and A. J. Williams and A. E. Burger from the Percy Fitzpatrick Institute of African Ornithology. The French also undertook a helicopter flight around and over the island for bird census purposes.

The annual relief of the meteorological team is scheduled for next month and the returning team is expected back in South Africa towards the end of May.

ARGENTINE AIR FORCE FLIGHT

One of the most significant flights in aviation history was made last month by an Argentine Air Force Hercules transport aircraft, which flew from Buenos Aires to Canberra and back, crossing the Antarctic Continent, and refuelling at an Argentine base off the Antarctic Peninsula. The 15,000-mile round flight was made as a feasibility study for the Argentine national airline, Aerolineas Argentinas, which is interested in developing a commercial route between Europe and Australia over the South Pole.

Brigadier-General Hector Fautario, Commander-in-Chief of the Argentine Air Force, who accompanied the crew of the Hercules on the historic flight, said on his return to Buenos Aires that he believed in the feasibility of establishing commercial services on the polar route. Such a route could halve flight time between Australia and South America, and reduce the flight time between Australia and Europe by about one-third.

With a crew of 14, survival equipment for 15 days, a polar tent, a boat, and cold-weather clothing, the Hercules, one of the later H models, left Buenos Aires at 9 p.m. on December 4. Six hours later it landed at the Vice-Comodoro Marambio base on Seymour Island, off the Antarctic Peninsula. During its three-hour stay the aircraft was refuelled for the non-stop flight across the Antarctic to Australia. The

Vice-Comodoro Marambio airstrip, one of two on Seymour Island, can be used by wheeled aircraft throughout the year. It is being doubled in length from 3936ft to 7872ft, and brought up to commercial standards with aluminium stripping.

On the flight of about 6000 miles from Seymour Island to Canberra the Hercules encountered 100-knot head winds as it approached Australia. As a result the flight took about 18 hours, two hours longer than scheduled, and the Hercules landed at the Royal Australian Air Force station, Fairbairn, on December 6 with about one hour's reserve of fuel left in its tanks.

The Hercules flew from Canberra to Christchurch on December 8. There it took on about 6500 gallons of fuel for the direct flight back to Seymour Island. It left at 11.55 p.m. on December 9 and landed at the Vice-Comodoro Marambio base shortly after noon the next day.

PROBLEMS IN POLAR CRIMINAL LAW

By F. M. AUBURN

(Faculty of Law, University of Auckland)

Little attention has been given, since 1961, to the legal status of the Antarctic Continent. It has generally been assumed that the Antarctic Treaty has frozen conflicts of rights and sovereignty. Recent developments suggest that this may not be so. In a number of instances which have not attracted a great deal of attention it has been evident that the political disputes continue.

Examples are the negotiations preceding the Convention for the Conservation of Antarctic Seals, 1972, the various views expressed at the Nansen Conference on Antarctic Minerals at Oslo in 1973, and the controversy connected with the visit to the Antarctic of the Argentinian Cabinet in 1973. Two of the ways in which the latent disputes may emerge in the near future are: firstly, through the necessity for regulating activities such as offshore mineral operations, commercial aviation, nuclear waste disposal or tourism; secondly, by legal proceedings directly raising the issues of sovereignty and jurisdiction.

The second possibility is illustrated by a decision of the Fourth Circuit of the United States Court of Appeals in 1972 which will be examined with special reference to its implications for Antarctic scientific expeditions. Mario Jaime Escamilla was accused of the involuntary manslaughter of Bennie Lightsey on Fletcher's Ice Island (T-3) in the Arctic Ocean on July 16, 1970. At the time the ice island was floating about 305 miles from Greenland and 200 miles off the Canadian archipelago.

The island is made up almost entirely of ice which probably originated from Ellesmere Island. In 1970 it measured seven by four nautical miles and was about 100ft thick. It has been intermittently occupied by United States nationals since 1952. The operation on

the ice island at the time of the alleged crime was supported by the Naval Arctic Research Laboratory and the United States Navy.

Before discussing the issues, a brief comparison of the legal setting of the T-3 incident and current Antarctic expeditions may be made. The Ross Dependency will be taken as an example of an Antarctic territory. Both areas either are or may be the subject of sector claims.

ARCTIC SECTOR

Canada may have an Arctic sector claim, although the current views of the Canadian Government are not entirely clear. New Zealand administers the Ross Dependency for which a sector claim was advanced by the United Kingdom in 1923. The United States holds that the Ross Dependency and T-3 do not belong to any nation.

Human activities both on T-3 and in the Ross Dependency are devoted to scientific research with naval and air force logistical support. The Antarctic Continent is subject to a treaty regime, but T-3 is not. The legal status of ice formations floating on the high seas in the Antarctic is not clear. The Escamilla case is therefore of great interest for Antarctic law not because of a perfect analogy, but because it is the closest available parallel in reported judicial proceedings.

Escamilla was taken to the United States and charged in a District Court in Virginia. The decision at first instance, and on appeal, did not detail the reasons for the assumption of jurisdiction which Escamilla had contested. It is therefore necessary to examine the prosecution's case to find the various possible grounds. It was argued that T-3 came within the special maritime jurisdiction of the court. The definition covers the high seas, any other waters within the admiralty and maritime jurisdiction of the United States, and any vessel belonging to the United States or its citizens.

One solution might have been to interpret "vessel" widely to cover Fletcher's Ice Island. Canada had informed the United States that it would not object to such a classification "for the purposes of the particular legal proceedings". This view would have avoided problems with Canada and also come within the words of the United States law.

The prosecution did not put forward this argument directly, but took the position that T-3 is part of the high seas. It may be that the logical inference from the vessel classification would be that the "ship" must belong to someone. The someone could only be the United States. Therefore the vessel argument, in the context of an ice island, might be very hard to distinguish from a claim to ownership which in turn is not far removed from sovereignty in this instance.

HIGH SEAS

The view that T-3 itself constitutes part of the high seas, thus coming within the statute, might appear somewhat strange to a glaciologist. It might also deny exclusive jurisdiction by the United States over those parts of Fletcher's Ice Island occupied by that country. The high seas argument is inconsistent with another view put forward, that jurisdiction could be based upon "vessel-related activities". The latter principle encounters the same problems as the "vessel" argument

because if the activities are related to a vessel, then T-3 must be that vessel.

Another possible basis for jurisdiction is nationality. But this assumes a denial of Canadian sovereignty over T-3. In the absence of special agreement a state has the jurisdiction to punish crimes within its territory. It is presumably for this reason that the Canadian Note previously quoted only related to jurisdiction over vessel.

It was also suggested that as the United States was the only state in a practical position to maintain order and apprehend offenders, the reasonableness of permitting it to do so seemed apparent. It may be questioned whether this view can be supported. In bringing Escamilla to the United States, operations were carried out from Canadian and Danish territory. Canada has in the past enforced its law in the Arctic Archipelago. Logically this view should not give a United States court jurisdiction because it admits that there is no basis in United States law for the other legal arguments.

It will now be clear that if such an incident occurs in the Ross Dependency, the accused would raise the question of sovereignty directly. Escamilla was taken to the United States and tried. It is suggested that an Antarctic Escamilla would be well advised to refuse to be moved from the continent, at least until he had received independent legal assistance. There are substantial grounds for advising such a person to demand trial in the Ross Dependency. If he were a United States civilian, or even in certain situations a member of the armed forces, he would have even stronger arguments than those put forward in Escamilla's case. If he were a New Zealand citizen he would demand trial by a Ross Dependency court under Ross Dependency law.

In addition to raising the sovereignty question such a trial would also involve the complex constitutional issues of the effects of the 1923 Orders-in-Council and the Antarctica Act. Some of these arguments, such as that challenging the validity of the Antarctica Act as Ross

Dependency legislation, could probably not be maintained by the accused in a New Zealand court.

The case is a warning to the Antarctic Treaty nations. At present Antarctic sovereignty disputes are muted by the consultative meetings under the treaty.

This procedure may work for activities such as tourism which require the previous permission of a treaty nation. It cannot prevent alleged crimes whose trial would, as in the Escamilla case, directly raise jurisdiction and sovereignty disputes.

OBITUARY

Sir Lionel Hooke was Radio Operator on Aurora's Drift

One of the survivors of the crew of the Aurora, which took the Ross Sea party south from Hobart on Shackleton's 1914-1917 expedition, died in Sydney last month at the age of 78. He was Sir Lionel Hooke, who was an 18-year-old radio operator aboard the Aurora when she broke away from her wintering station off Cape Evans, in McMurdo Sound, on May 6, 1915, was trapped in the ice for eight months, drifted 1200 miles to the north and westward, and finally was towed into Port Chalmers on April 3, 1916, by the tug Dunedin.

Lionel Hooke, who was knighted in 1957 for his services to the radio industry, was sometimes referred to as the "Father of Australian Radio," and at the time of his death he was the titular head of Australia's largest electronics company, AWA. He was born at Brighton, in Victoria, and even as a schoolboy he showed an interest in radio. In 1913 he joined the Marconi company, but the same year AWA was formed and took over the company and its staff, including Lionel Hooke.

Soon afterwards Hooke joined Shackleton's Imperial Trans-Antarctic Expedition. There was dissension among the crew of the Aurora on the voyage out from England, and several were discharged in Sydney. Hooke was one of the men engaged to fill the gaps.

The Aurora called at Macquarie Island where a radio station had been erected by Sir Douglas Mawson's Australian Antarctic Expedition, and reached a point off Cape Evans on January 16, 1915. She then worked southward after

landing coal and oil, and by January 24 was fast to sea-ice 9 miles from Hut Point. Captain Aeneas Mackintosh, leader of the Ross Sea party, decided to direct the laying of the depots himself, and to leave Lieutenant J. R. Stenhouse in command of the Aurora.

Three parties then set off at intervals towards the end of January. Hooke was one of a supporting party of six men with J. L. Cope in charge. The sledging party of Hooke, A. H. Ninnis, who was in charge of the motors, and R. W. Richards (physicist) took the motor sledge almost to Hut Point where it broke down. They then continued to Corner Camp on foot. Because of the breakdown of the motor sledge the supporting party did not get very far.

On March 11 Hooke and five others were picked up by the Aurora at Hut Point. He was aboard when the ship broke away in 1915, leaving behind ten men who were not rescued until early in 1917. Their story has been told in Ernest Joyce's "The

South Polar Trail" and "The Ross Sea Shore Party" by Richards. But the full story of the Aurora's long drift of ten months in the pack ice, and her continuous and dangerous struggle with the ice has still to be written.

Soon after the Aurora began her drift the radio aerial was rigged and Hooke tried unsuccessfully to communicate with Macquarie Island (1,340 miles away) and Bluff (1,860 miles away). He made many more attempts to send messages during the drift but the signals were not heard. On June 1 he tried to call Macquarie Island but the staff there had been recalled to Australia as a war economy, and the radio station had been moved to a safer place.

Then on August 25 Hooke reported to Stenhouse that he had heard Macquarie Island and Bluff sending weather reports and exchanging signals. Stenhouse wondered whether Hooke's signals had been heard, and the stations were trying to reach the Aurora. Later he learned that no message had been received by any station.

Hooke first heard Macquarie Island calling Hobart on August 17. On March 1 the next year the Aurora was free of the ice, and Stenhouse headed his battered rudderless ship towards New Zealand, struggling northwards in heavy weather against persistent head winds and head seas. Three weeks later Hooke established radio contact with Bluff, and sent out details of the expedition. The next day he was in touch with Hobart and Wellington.

The message was sent 900 miles on March 23 with an apparatus normally suitable for a radius of about 200 miles. A newspaper report at the time commented that the news "eclipsed for a day at least the interest in the great world war."

Like other members of Shackleton's expedition Hooke had an unusual wartime career. He was first a deck officer in submarine-chasers, and then commanded armed rescue patrol tugs in the Irish Sea. Later he became a pilot in the Royal Naval Air Service, and piloted one of the small airships used for submarine spotting.

"Animal VC" Award

A member of the 12th South African National Antarctic Expedition—Mr Andrew Paterson—who risked his life in 1971 to rescue Topper, a sledge dog, has been awarded the silver medal for bravery of the South African Federation of the Society for the Prevention of Cruelty to Animals.

Mr Paterson, a 25-year-old former Pretoria geologist, was accompanying a geological survey team on an inland expedition from Sanae Base when the dog fell through a snow bridge and down a crevasse the height of an eight-storey building.

Mr Paterson volunteered to try to rescue the dog. He was winched down the crevasse on the end of a cable, calmed the frightened animal, and remained alone in the crevasse while the dog was winched up to the surface. Fifteen minutes later Mr Paterson was winched up.

Soviet ice shelf

One of the most complex tasks of the 19th Soviet Antarctic Expedition was carried out in January. Scientists and 1000 tons of cargo were transferred from the freighter Olenyok to the Avery Ice Shelf, where a base has been established for completion of the geological, geophysical, and geodetic survey started in Mac-Robertson land two years ago.

Ships of the new expedition reached Antarctic waters late in December. First operations began on the ice of the Sea of Cosmonauts, at the approaches to Molodezhnaya.

Off the Antarctic Peninsula the Argentine icebreaker General Sam Martin visited Bellingshausen Station in Ardley Harbour on King George Island. A group of Soviet scientists visited the ship and inspected the laboratories of their Argentinian colleagues.

QUAIL ISLAND'S LINK WITH EXPEDITIONS

By BADEN NORRIS

Quail Island, a tiny island in the harbour of Lyttelton, has a link with Antarctic history. It was once a quarantine station for the port, and was a temporary home for the dogs, ponies, and mules of the expeditions of Scott and Shackleton. There the animals spent their last weeks in civilisation, romping in the lush grass, enjoying the balmy sunshine, and being trained for the task ahead.

Only 180 acres in extent, Quail Island is about a mile to the south of the port, immediately opposite the inner harbour entrance. It is wooded with exotic conifers but there are sufficient grassed clearings to support a small farm.

The island was named for the now extinct native quail, which its first European visitor, Captain W. Mein Smith, flushed out in 1842. The Maoris called the island O Tama Hua or Te Kawa Kawa, and occupied the western end as the remains of their fires attest.

Soon after the arrival of the first Canterbury settlers at Lyttelton in 1850 Edward Ward chose 100 acres on the north-eastern portion of Quail Island. He farmed it with his two brothers for about six months. Then he and one brother, Henry, were drowned when their boat capsized in Lyttelton Harbour. The land was farmed for about three years, and was recorded as a Crown grant in 1958. It was sold in 1874, and two years later it became Crown land again when the stock quarantine station was moved to the island from Camp Bay.

Quail Island was Lyttelton's third quarantine station. Camp Bay was the first, and the next was Ripapa Island. It served not only to give shelter and comfort to passengers and crews of vessels which had been ravaged by the dreaded diseases often associated with long sea voyages from the other side of the world. With its rich grass and abundant springs of water it was well

suited as a quarantine station for stock.

Many years ago Quail Island was a leper station for a period. But its role as a quarantine station for the animals of three Antarctic expeditions is best remembered.

FIRST DOGS

Twenty-three dogs of Scott's first expedition were quarantined on the island while the *Discovery* was docked and made ready for the historic voyage south, which began from Lyttelton on December 21, 1901. Little has been recorded of how the dogs fared on the island; it is known that when they were reunited with the ship they were in capital condition.

The nine dogs of the Nimrod expedition of Ernest Shackleton were really New Zealand dogs. They were obtained from the descendants of 75 dogs left at Stewart Island by C. E. Borchgrevink when he returned from Cape Adare in 1900. Eleven dogs remained seven years later in the care of Mr A. W. Traill, of Ringa Ringa Point.

When the dogs were brought to Christchurch by rail in the charge of Ernest Joyce on December 19, 1907, they were taken to Quail Island to be trained and to join the 15 Manchurian ponies already there. The five dogs and four bitches had been named by the Traill family Scamp, Rowsey, Possum, Queen, Dido, Bosun, Huka, Spot, and Battie.

Dr Alistair Forbes Mackay, biologist and surgeon of the expedition, had been given by Shackleton the responsibility of looking after the animals in the Antarctic. He joined Mr W. H. Tubman, a nationally known horse breaker and trainer, to break in the most unruly ponies in the short time before the Nimrod sailed south. Mackay was experienced in handling horseflesh; he had been a trooper in the South African War, and one of Baden-Powell's police.

Mr Tubman reported that never had a wilder herd of horseflesh ever been placed on the island. The ponies took charge of the holding yard and kept two men on the safe side of the rails for several hours before they could be controlled. But one week after the ponies had been placed in Mr Tubman's care he said that they were so quiet he would drive any one of them through the streets of Christchurch. One pony which had a vicious kick and bite if aroused had been named Shackleton in a backhanded compliment to the expedition's leader.

On Quail Island the ponies were fed on maize and hard fodder to help them get used to their future Antarctic diet. They impressed Mr Tubman very much, and he was loud in his praises of their ability. He described how one could pull half a ton over the sand, and said that all would be a great success with the expedition.

Thanks to the care of Mr Tubman the ten animals chosen finally to go south were in top condition when the Nimrod sailed. Any failure or misfortunes in the Antarctic could not be blamed on their trainer.

LAST EXPEDITION

Nineteen ponies and 33 dogs were quarantined on Quail Island before Scott's last expedition left Lyttelton in the Terra Nova. All the ponies had been bought in Manchuria. Thirty of the dogs were Eastern Siberians, all males. The others were two Eskimo dogs given to the expedition by Peary,

conqueror of the North Pole (christened Peary and Cook), and a New Zealand collie bitch.

Scott used a motor launch left at Lyttelton by the Nimrod to make frequent trips to the island to inspect and get to know the animals. On November 15, 1910, the Governor of New Zealand, Lord Islington, and Lady Islington, with Lady Stapleton Cotton, visited the island with Scott. They watched five dogs and several ponies being put through their paces dragging a sledge over the grass slopes.

The climate and the general atmosphere of the island appeared to have agreed with the animals for all were reported to be in fine fettle. The ponies, romping and rolling in the long, dry grass, and enjoying the warmth, gave a fine display, much to Scott's satisfaction.

Only a few days later the little harbour steamer Purau towed the ponies in a lighter from the island for transfer to the Terra Nova. They were very quiet; and they were not to know their lives were forfeit.

Quail Island's last association with Antarctic expedition animals was in the spring of 1911 when seven Indian Army transport mules and 14 more Siberian huskies were placed in quarantine before they were taken south on the second voyage of the Terra Nova.

On February 7, 1912, the mules were landed at Cape Evans. In the spring of that year they were the chief transport of the party which found the bodies of Scott, Wilson, and Bowers. They worked well, and several members of the expedition in their accounts of the Barrier journey remarked how quiet they were. No doubt this was the result of their training on Quail Island.

Today Quail Island is a pleasant picnic spot, sheltered and peaceful. There is nothing on the island to hint at the important part it once played in the exploration of Antarctica.



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.

REINDEER HERDS

69 Welman Croft,
Selly Oak,
Birmingham B29 6NR,
England.

Sir,—In the March, 1973, issue of "Antarctic", you have a short article concerning reindeer on the sub-Antarctic island of South Georgia and their possible introduction to the Falkland Islands. The reindeer herds on South Georgia now number more than 2000 animals and have recently spread across two glaciers in search of new grazing grounds.

In one particular area, Royal Bay, where the reindeer have been present for less than ten years, their damage to plants through trampling and grazing has been very severe. Swards of the burnet (*Acaena*) and lichens such as the Iceland moss and reindeer moss have been totally destroyed in Royal Bay, and the tussock grass is showing signs of heavy grazing. On the Barff Peninsula, where the reindeer were originally introduced 60 years ago, tussock grass has been totally eliminated.

Because of this, the concern at the introduction of reindeer to the Falkland Islands, where tussock grass has now become almost extinct through the grazing of cattle, is quite understandable. The ecosystems of many of the sub-Antarctic islands have been severely modified by human activities; although economic necessity often dictates the course of events further destruction of the already highly disturbed grazing grounds of the Falkland Islands should

be avoided until more information is available on reindeer feeding habits and how much damage they cause to plants.

There have been suggestions that the reindeer on South Georgia be culled for their meat and also to prevent further spread around the island. Economic development along the lines of a mobile canning factory, as suggested by Mr M. Utsi, who runs the Cairngorm herd of reindeer in Scotland, may be an effective proposition for South Georgia.

Yours etc.,

D. C. LINDSAY
(Botanist, South Georgia, British
Antarctic Survey, 1971-72).

OBSERVATION HILL

Sir,—Men at McMurdo Station are apparently using the rocky, gravel slopes of Observation Hill as a physical training track, and attempting to break a record for the climb set by a United States Navy doctor in 1972. The doctor, who is naturally concerned with the health and fitness of men at the station, has received official authority from Washington to give a higher rating to the Observation Hill climb than other physical training exercises used by the Navy. But it should be remembered that Observation Hill has been an historic spot in Antarctica for more than 60 years. At the summit is the cross erected in memory of Scott and his companions, and recognised as an historic monument by the Antarctic Treaty nations.

Yours etc.,
"JAMES PIGG"

ANTARCTIC BOOKSHELF



ANTARCTICA. EDITED BY CHARLES NEIDER

Published by George Allen and Unwin. 464 pp. N.Z. price \$10.85.

"At around midnight the sun broke through in a molten white splash in the south, saffron streamers flowing from it. The ice dimples and sastrugi were sharply revealed. A small, gentle white cape lay on the horizon's left side, showing bits of black like ermine tails." New Zealand's Graham Billing? No, this is part of the introduction by the American, Charles Neider, described in this volume as "one of the very few literary men to work in the Antarctic." The introduction gives some substance to this claim.

This is an anthology of Antarctic prose. It comprises carefully chosen (both in content and length) extracts of life and exploration from the eighteenth century to present times. The interesting thing is, that apart from Mr Neider's introduction, it has all been published before.

A reader's degree of interest in this volume (assuming a basic interest in Antarctica) will be in inverse proportion to his familiarity with the journals of James Cook, George Forster (who sailed with Cook), Thaddeus Bellingshausen, James Weddell, Charles Wilkes or James Clark Ross. And following down the years we have Amundsen, Scott, Shackleton, Ponting, Cherry-Garrard, Byrd, Siple and Hillary.

The extracts are each introduced with a succinct and intelligent background to the author's life. Sometimes the reader is left groping as to the point where the tale in question is taken up, although in some cases the author's introduction adequately covers this. Usually, however, any lack of orientation is soon dispelled by the texts themselves.

The early texts contain some fascinating insights into the lot of seafarers who went south in the eighteenth and nineteenth centuries. George Forster gives a colourful and human statement

of life on board the Resolution (Neider does not mention the name of the ship) balancing the more nautical journal of Captain Cook. On one occasion there was only a difference of "two degrees and a half" between the temperatures on the deck and in the cabin "rotting in the wet which it admitted, and being mouldy." (page 64).

The voyage of James Weddell, the early British sealer, commences in the Northern Hemisphere, and the reader is soon startled by the enlightened and indignant protests of Weddell after his encounter with a Portuguese schooner on November 14, 1822, with a cargo of 250 slaves.

Mr Neider's choice of material is such, that even to the newcomer to Antarctic reading, the book could be profitably read without reference outside the volume and the single map provided. It will also stimulate readers to look beyond, to other maps and references, and in this respect L. B. Quartermain's 'South to the Pole' is an excellent complementary volume.

Mr Neider has been unobtrusive and accurate in his textural comments, as far as they go. Possibly he has not commented enough, and there are many instances where an appropriate footnote would have added further interest to the text. For instance on page 142 the reader could well be enlightened by a simple footnote as to the type of penguin described in Wilkes' account, at Macquarie Island. The Bellingshausen text, taken from the translation edited by Professor Frank Debenham in 1945, is noticeably improved by Debenham's footnotes which have been retained.

The selection of twentieth century pieces is fairly predictable as far as the "heroic" era is concerned although Cherry-Garrard's "Worst Journey in the World" would possibly have been better

placed before Scott's last diary (the rest of the volume is arranged in chronological order). The inclusion of Ponting without any of his photographs, as a third writer from the British Antarctic Expedition of 1911-13 is at first glance surprising, but the piece chosen is a sensitive description of photography and bird life around Cape Evans.

Byrd's fight against death while alone at Bolling Advance Weather Station in 1934 makes further dramatic reading while Siple's "Living at the Pole" from

"90 Degrees South" is an account of the psychology of leadership under the stress of isolated conditions.

The shortest and concluding chapter is a brief narrative by Hilary on negotiating crevasses somewhere (the position is not established) during the Trans-Antarctic Expedition.

In all, the editor and publishers have produced a book which will be of value to both the uninitiated and seasoned reader of Antarctic literature.

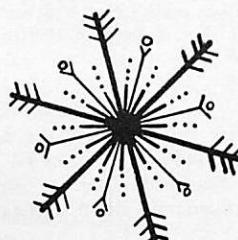
—R.G.M.

MARINE SEDIMENTS OF THE SOUTHERN OCEANS

Folio 17, Antarctic Map Folio Series. Edited by Vivian C. Bushnell, American Geographical Society, 1973. pp. 1-18; plates 1-9.

Folio 17 is subdivided into four consecutive sections. The first, by H. G. Goodell, deals with the sediments. It is mainly a condensed review with up-to-date previous work, and because of the large physical area involved the details are necessarily plotted onto excellent maps. The paragraph on stratigraphy on page six illustrates the limitations of the publication which deals only with Pleistocene-Recent sediments. The more recent voyages of the Glomar Challenger in 1972-73 on Legs 28 and 29 will greatly extend this knowledge back into the early Cenozoic.

I think it worth quoting Goodell's rather remarkable conclusion: ". . . the understanding of the composition and distribution of Antarctic pelagic deposits, and to a large extent the processes responsible for them, have not significantly altered since the initial publication of the Challenger's findings by Murray (1876, 1889) and Murray and Renard (1884a, 1884b, 1891)."



The second section covers sediment isopachs in the Indian and Pacific sectors (105°degE to 70°degW). It is by R. Houtz M. Ewing, D. Hayes and B. Naini.

Plate 5 in this section is a sediment isopach map which was compiled from marine seismic data and Houtz *et al.* point out that the contours "represent tenths of seconds of two-way reflection time between the sea floor and the base of the sedimentary column". Consequently the contours do not represent true thicknesses. There are five profiler sections, which supplement this information, from various sedimentary provinces of the southern ocean.

Section three deals with distribution of foraminifera in the surface sediments. The authors are R. J. Echols and J. P. Kennett.

The work by Brady (1884) to Echols (1971) on Recent foraminifera in surface sediments is briefly reviewed and known distribution of seven planktonic and four benthonic species are recorded. The percentage of benthonic calcareous tests has also been plotted.

The final section by J. G. Donohue deals with distribution of planktonic diatoms in the surface sediments of the southern South Pacific. The distribution of planktonic diatoms is briefly discussed and a plot of the distribution of seven species from surface sediments is recorded.

Folio 17 continues the over-large text format which is probably produced to accommodate the relatively unfolded maps in the folder. The four papers are mainly review in nature but provide valuable maps showing the distribution of surface sediments and selected foraminifera and diatoms. It would have been a more valuable work if

Radiolaria had also been dealt with.

Apart from these minor criticisms the Antarctic Map Folio Series continues to be a prestige publication, and the editor, Vivian C. Bushnell is to be congratulated on maintaining the high standard.

DR. GRAHAM JENKINS
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TOURISM

LINDBLAD EXPLORER UNABLE TO REACH McMURDO STATION

Because United States Coast Guard icebreakers had not completed cutting the channel in the ice of McMurdo Sound, the Ross Dependency section of the Linblad Explorer's summer tourist cruise to the Antarctic was cut short. The ship could not reach McMurdo Station. Instead it spent three days off Cape Royds, and 30 passengers, half of them women, made the 18-mile journey there and back to Scott's hut at Cape Evans.

One result of the reduced programme was that a New Zealander aboard the Linblad Explorer had to fly home to Christchurch from Peru instead of McMurdo Station. Mr B. N. Norris, who has had a long association with wildlife and the Antarctic, was aboard the ship as a ranger for the Lands and Survey Department's outlying islands' committee. As the ship called at several sub-Antarctic islands on the way south Mr Norris was there to ensure that the passengers did not disturb the flora and fauna during their visits.

From Auckland, which she left on December 22, the Linblad Explorer sailed south, calling at the Snares, Auckland, Campbell, and Macquarie Islands. No landing was made on the Snares. On January 2 the ship anchored in Robertson Bay off Cape Adare. There the passengers inspected the site of Borchgrevink's 1899-1900 expedition and the large penguin colony nearby.

Mr Norris had a mission at Cape Adare for the Antarctic Division, Department of Scientific and Industrial Research. He took with him from New Zealand a set of four bronze plaques to mark the first known grave in Antarc-

tica, that of Nicholai Hanson, the Norwegian zoologist who died while serving with Borchgrevink's expedition. ("Antarctic," December, 1973. Page 419).

Hanson was buried at the foot of a big boulder 1000ft up on Cape Adare. The grave has been designated an historic monument. Mr Norris and his party took five hours to find the grave, and were unable to place the plaques on the boulder.

Once again the Linblad Explorer had bad luck in McMurdo Sound. It was moving away from the entrance when it struck thick ice which opened up a hole in the forepeak. As a result the ship lost 25 tons of fresh water. Although the desalinisation plant could produce 18 tons a day, there was nowhere to store it because the main tank could not be used. For the rest of the voyage to the Antarctic Peninsula the passengers were unable to wash their clothes.

On the voyage to Ushuaia, the main port of Tierra del Fuego, the Lindblad Explorer sailed up the coast of the Antarctic Peninsula, calling at Argentinian, Chilean and British, and Russian bases.

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The New Zealand Antarctic Society (Inc.)

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

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

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

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

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