

ANTARCTIC

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Photo: J. T. Darby

A FEW OF THE NATIVES

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"ANTARCTIC"

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DECEMBER, 1967

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VANDA STATION

NEW ZEALAND'S NEW ANTARCTIC BASE

Construction has been completed of what will ultimately be a year-round scientific station at Lake Vanda in the Wright Dry Valley, Victoria Land, some seventy miles from Scott Base.

The building of Vanda Station is an impressive milestone in New Zealand's scientific exploration of the Ross Dependency. Since the International Geophysical Year, proposals have been made for setting up a permanent station in the ice and snow-free McMurdo Oasis. It was intended that a station should be jointly established this summer by the New Zealand Antarctic Research Programme and the United States Antarctic Research Programme with possible Japanese participation, but this did not eventuate because of other U.S.A.R.P. commitments. New Zealand then took the initiative and is now in a strong position to diversify and improve her scientific involvement in Antarctica.

This summer season the newly completed base will be used by scientists from Victoria University of Wellington and in 1969 it is proposed to have a party winter-over at Vanda Station. When the station is continuously manned, New Zealand's scientific element in relation to logistic support will be one of the highest for any signatory nation to the Antarctic Treaty.

THE DRY VALLEYS

North of the Taylor and Ferrar Glaciers of Victoria Land, west across McMurdo Sound from Scott Base, lies an area of some 1,500 square miles of relatively ice-free land which has become one of Antarctica's most intriguing puzzles. In this "dry valley" region or McMurdo Oasis New Zealand has now established a small but adequate

base where, from the 1968-69 summer, it is hoped to take year-round observations of climatic and other conditions which will help to solve the problems posed by this and similar strangely ice-free areas in various parts of the Antarctic.

The Ross Dependency Dry Valley region is easily the most extensive yet discovered. It is much larger than the Bungee Oasis, the discovery of which by airmen of Operation Highjump was so widely publicised in 1947. In this McMurdo area, which lies between latitudes 77°S and 78°S, and between longitudes 160°E and 163°E, there are three major valleys, once glacier-filled, from which the ice has retreated, leaving a barren and rocky or sandy valley floor.

THE PIONEERS

The upper part of the most southerly, the Taylor Dry Valley, was discovered by Scott in December, 1903; explored, the lower part of it, by Armitage, Priestley and Brocklehurst in December, 1908-January, 1909; and almost the whole valley by Taylor, Debenham, Wright and Petty-Officer Evans in February, 1911.

When, later, Griffith Taylor's four-man team was returning south along the coast from the second "Western Journey" to Granite Harbour in 1911-12 they sledged over the piedmont extending from Cape Roberts to Cape Bernacchi, and at about 77°22'S, in early March, 1912, they made a detour towards the west which brought them nearer to an unnamed "inlet" shown on

Scott's early map. This now appeared to be a glacier, which was named after C. S. (now Sir Charles) Wright, the Canadian physicist of the expedition, who was a member of the team which made the first thorough investigation of the Taylor Glacier and Valley.

But what lay to the north, between the Wilson Piedmont Glacier, skirting the coast, and the ice plateau to the west, was still unknown.

The first inkling of what was there was given by some air photographs of Operation Highjump in 1947 which were published in a U.S. Air Force manual, "Regional Photo Interpretation Series, Antarctica", in 1953. These show at 162° E., 78° S. ground moraines "left in place as the glacier melted back" and a "dry" valley.

Little attention was paid to this. But when American and New Zealand airmen in 1956-57 made a more extensive air-photographic survey, their photographs aroused the interest of New Zealander Ron Balham and through him of two young geology students of the Victoria University of Wellington, New Zealand, **B. C. McKelvey** and **P. N. Webb** who determined to visit the area for themselves. With indomitable persistence and after many set-backs, they obtained permission to travel south as cargo-handlers on the New Zealand supply ship H.M.S. "Endeavour" which happened to have two empty berths. They left Wellington on December 14, 1957, Webb's 21st birthday.

As temporary crew members, not attached to the infant Scott Base, the two young men were in constant danger of being bundled back to New Zealand. Webb joined forces with **Balham** of the wintering-over Trans-Antarctic Expedition team, **Barwick** of the T.A.E. summer party 1956-7 and 1957-8, and **Packard** of the 1957-58 summer party, and the four of them were flown by U.S. helicopter in early January, 1958, to a dry valley now known as the Victoria. They set up camp at Lake Vida, and on January 7 Webb

climbed one of a row of 5,000 ft. high peaks south of the lake, and became the first man to see from ground level the general lay-out of the Dry Valley system.

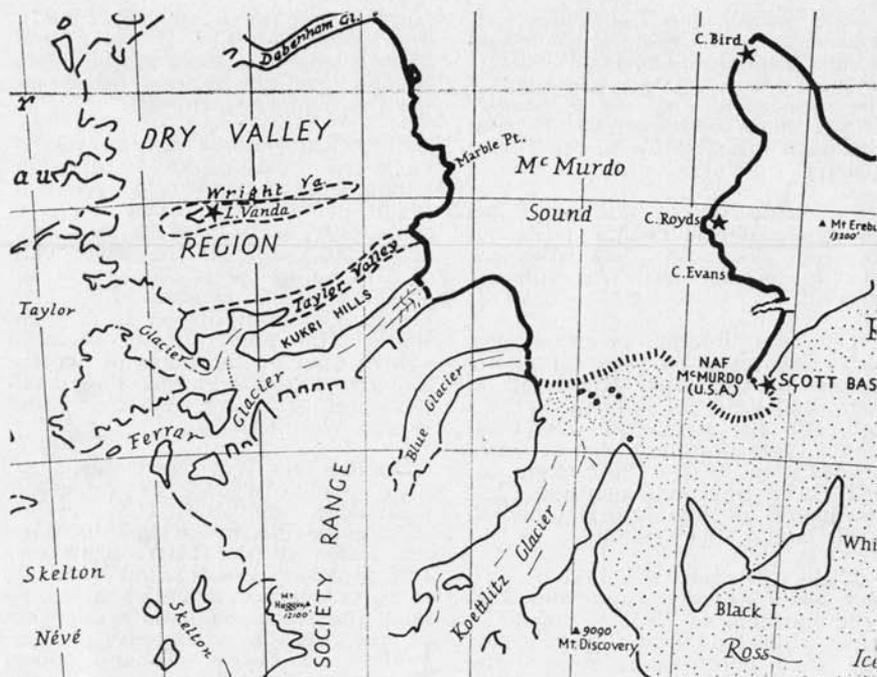
The most notable feature was a large dry valley some 35 miles in length, once clearly the course of a great glacier still extending for some miles east from the ice cap, and recognisable at the lower end of the valley as a vast mass of stagnant ice coalescing with the Wilson Piedmont Glacier in 77°25'S, 163°E. This proved to be the unnamed inlet on the maps of Scott's first expedition, which is shown on the maps of Scott's 1910-13 expedition as Wright Glacier.

On the 18th Webb and McKelvey were about to sail as reluctant passengers on the U.S. vessel "Greenville Victory" when Lin Martin, leader of the I.G.Y. team for 1958 at Scott Base, invited them to join an American scientist in examining the palaeomagnetic properties of the Beacon sandstone in the Taylor and Ferrar glacier region. They spent late January and early February camped in the Taylor valley before returning to New Zealand on February 17 on an American vessel. Their whole expedition had cost little over £100.

The four-man Northern Party of the Trans-Antarctic expedition under Brooke sledged round the perimeter of the Dry Valley area in January, 1958, and from a few vantage points made a provisional map of the region, but were unable to make their way into it.

INTO THE WRIGHT VALLEY

In the following summer 1958-59 a team of four sponsored and financed by the University, now "approved" by the Ross Dependency Research Committee, and aided by the United States Antarctic Support Force, headed south to investigate the Dry Valley region more fully. The team comprised **Colin Bull**, Ph.D. (leader), **R. E. Barwick**, M.Sc., **B. C. McKelvey**, B.Sc., and **P. N. Webb**, B.Sc. A full air-photo cover-



age was now available from T.A.E. and U.S. sources. On November 27 Webb and McKelvey flew in an Otter aircraft doing a photo reconnaissance up the Taylor Glacier to the plateau, then down the whole length of the Wright Glacier and Valley. On another flight on December 8 all four men took part, and on December 10-11 they were flown in by a United States helicopter to the eastern shore of the five-mile long Lake Vanda, where they set up their main base. From then till January 30, 1959, they spent a busy seven weeks doing geology, glaciology and gravity survey, survey, mapping and photography, with a dash of biology—examining the carcasses of seals so puzzlingly found so far inland.

So the first detailed map of the valley was made. The name Wright was retained for the truncated glacier and applied also to the dry valley in which the upper part ends.

LAKE VANDA

Vanda is an ice-covered lake in $77^{\circ}32'S$, $161^{\circ}30'E$, which thaws only in mid-summer and then only on the beach-line. In summer also melt streams enter the lake from near-by glaciers.

The name Vanda was given to the lake because Colin Bull, leader of the 1958-59 Victoria University expedition, had a dog named Vanda when he was working in North Greenland.

The exact site for the new station was selected in January, 1957, by Mr. R. B. Thomson, Superintendent of the Antarctic Division, D.S.I.R., and Mr. J. H. (Bob) Miller, deputy-leader of the New Zealand component of the Trans-Antarctic Expedition. The site is 150 yards south-east of the lake, 120 yards from the Onyx stream and 30 feet above sea-level.

A NEW ZEALAND STATION

When it was decided that New Zealand should go it alone to establish a station in the area, economy demanded a modest establishment, and it was decided to use two huts already constructed and set up on Ross Island. One was the auroral radar hut at Arrival Heights, to be used as a laboratory, the other the biological hut at Cape Royds, very suitable for living quarters, and not now required because of the transfer of the penguin-studies to Cape Bird. The first hut was dismantled and carefully packed for air transport to the new base site. Ice conditions made it impossible to prepare the Royds hut for transport at this time, so a new hut designed by Thomson and Webb was built at Scott Base as a stores hut. The Royds hut will be transferred to Lake Vanda, in mid-January.

Operations began early in October when Scott Base personnel under Colin Clark, with the support of 13 R.N.Z.A.F. men flown in on October 12, worked long hours packing the 40,000 lb of equipment and stores into 19 special containers for parachuting to the base site. This material included the sections of two huts, electrical equipment, food, a Gnat motor vehicle—and a wheelbarrow. Everything was weighed before being packed because the weight factor for individual loads was of paramount importance.

The recovery party for the air-drops consisted of Scott Base men with Warwick Orchiston as leader. They were flown to the site by U.S. helicopter on October 13, pitched their camp, and set up their radio link with Scott Base. Delays in flights from New Zealand now held up the arrival of additional workers. Nine members of the relief party due on October 11 had still not arrived on the 16th, the date fixed for the drop.

The new station will be used this summer by a Victoria University of Wellington team, but will not be occupied next winter.

OPERATION ICE CUBE

Five flights were necessary. The aircraft was under the command of Wing Commander D. J. O'Connor. All flights left from the sea-ice runway at Williams Field, four miles from Scott Base. The pallets were loaded on to sledges and towed to Williams Field, where two hours were required to load the aircraft for each flight.

On the 15th Mr. Thomson and the new Scott Base leader Bill Webb accompanied Wing Cdr. O'Connor on a reconnaissance flight over the area and an inspection of the dropzone—on the frozen surface of the lake. Mr. Thomson was also on board the Hercules during the first drop on the evening of the 16th. The remaining drops were completed during the night.

Wing Cdr. O'Connor said that because the valley is surrounded by precipitous mountains, each drop-run had to be carefully carried out. The run was made down valley, and there had to be a sudden sharp descent from above the mountains to the required dropping height—by which time the aircraft was already half way over the lake. "For each drop," he said, "we reduced speed to 130 m.p.h. This is about as slow as the Hercules can be safely flown."

On the drop-run the large ramp at the stern of the aircraft is opened. When the aircraft is over the target (in this case the frozen surface of Lake Vanda) the stowing lines are cut and the nose of the aircraft raised. The loads drop out and parachutes are deployed automatically by static line. Each run is made at 1,000 feet.

ON TARGET

Nineteen containers, the largest weighing 3,300 lb, were used. A few items were damaged and the contents scattered, but a Gnat vehicle, considered the most difficult portion of the cargo, was successfully landed, and was later used for hauling containers to the lake shore.

In what was described by the ground party at Vanda as "preci-

sion flying" each load landed well inside the target perimeter. The accuracy was such that falling containers could well have damaged those already on the ground. The Scott Base leader, W. J. Webb, in paying tribute to the skill of Wing Cdr. O'Connor and his crew, said "There was little margin for error, and none was made."

This was the largest operation of its kind since the Americans built Amundsen-Scott Station at the South Pole in 1956.

U.S. HELP

Two United States Navy helicopter crews helped to avoid a delay of several weeks in the construction of the station. Two weeks after the New Zealand Hercules made a number of airdrops of equipment needed to establish the station, much of it was scattered over a wide area in the valley. In two days the two helicopter crews recovered 12 tons of cargo which would have taken the New Zealanders several weeks to gather.

It took construction teams under G. N. Reilly three weeks to erect the first two huts—ahead of schedule. Assistance in this work was provided by two volunteers from the New Zealand Antarctic Society, G. N. Hamilton of Christchurch and B. D. Norton of Wellington. Later this season the third hut, the one previously used by the University of Canterbury Biological Unit at Cape Royds, will be dismantled and then taken to the Wright Valley. This will involve transportation by helicopter to an icebreaker for transport across McMurdo Sound to Marble Point and then by helicopter again up the Wright Valley to the base site.

"Operation Ice Cube" was the first internal support operation for an Antarctic project by the R.N.Z.A.F. since the Antarctic Flight was disbanded in 1959.

Scott Base has the world's most southerly examination room.

The ionospheric observer, D. Henderson, is sitting papers in elec-

INTERTIDAL CREVICE FAUNA

Last summer Dr. Craig Kensler investigated for the Marine Fisheries Division the little-known marine life living in crevices in the zone between high and low tides on several parts of the Antarctic coast line (see "Antarctic," March, 1967, p. 435).

"During my five weeks in the Ross Sea region," says Dr. Kensler, "I was able to locate and examine several ice-free shorelines which possessed rocky outcrops and sand beaches. Intertidal rock crevices and the contained sediments were examined for a micro-fauna. Intertidal sand was also collected and examined for marine interstitial invertebrates (a specialised micro-fauna inhabiting interstices between sand particles). The results of the study have been exciting (to say the least) and suggest that a highly specialised—although restricted—invertebrate fauna is present in the summer along the Antarctic littoral."

This summer Dr. Kensler is returning to the Antarctic, again under the sponsorship of the New Zealand Antarctic Division. He plans to spend a fortnight early in January completing his special study. With him will be Mr. H. K. Schminke of the Zoology Department of the University of Kiel, Germany. Mr. Schminke is at present in New Zealand investigating and collecting interstitial fauna. He will make a detailed study of interstitial species; this is his own specialty in Germany. He has already examined the majority of the material collected last year by Dr. Kensler and has made a number of very interesting finds. The two men's interests in the Antarctic intertidal fauna are similar and since they wished to examine the same type of intertidal locality they decided to submit a joint programme. They also wish to assist each other with collecting.

tronics, telecommunications and mathematics for a New Zealand certificate of engineering.

MOUNT HERSCHEL IS CONQUERED BY NEW ZEALAND MOUNTAINEERS

Four members of a nine-man team of experienced climbers led by Sir Edmund Hillary have made the first ascent of 11,475 ft. Mount Herschel in the Admiralty Range, Victoria Land, described by Hillary as "possibly the most beautiful and challenging peak in the Antarctic."

The only alteration in the nine-man team as published in our September issue was that J. Wilson was replaced by Dr. P. J. H. Strang. N. D. Hardie, a consulting engineer and experienced mountaineer, was appointed deputy leader.

The objectives of the expedition as outlined for "Antarctic" by Sir Edmund, were:

- (1) **Mountaineering:** to attempt Herschel by the north and the east ridges.
- (2) **Geology:** to travel overland into the Robertson Bay area via the Moubray Piedmont glacier and the Adare Saddle in order to carry out the geological programme planned by Dr. H. J. Harrington.
- (3) **Surveying:** to try and resolve some of the major differences in height and position between the maps produced by the Harrington party of 1957-58 and the American maps based on aerial photography and some ground check points.
- (4) **Testing the performances** of new types of tents, radios and motorised toboggans.

OLD HANDS

Of the nine team members six have had previous Antarctic experience. Murray Ellis accompanied Sir Edmund on his tractor journey to the Pole in 1957-8; Larry Harrington led the geological and mapping party in the Tucker Glacier area in 1957-8 and in the McMurdo area in 1958-9; White was also in the party; Graham Hancox was a geologist in the northern party in 1966-7; and Norman Hardie was a member of a New Zealand team which trained Americans in icecraft at McMurdo in 1962-3. All

the team have had extensive mountaineering experience.

The team left Christchurch on a U.S. Constellation on October 18, for McMurdo. Eight of the men flew the 380 miles to Cape Hallett on October 21. For transport from Hallett the party had two American fibreglass toboggans powered by 20 h.p. engines. After making their way to the eastern spur of the northern ridge of the mountain, the climbers made reconnaissance treks in what Sir Edmund described as "difficult snow" before an advance camp was established at 3,400 ft. Routes were now examined in preparation for a dual assault on the mountain.

TRIUMPH

On October 27 Gill and Jenkinson reached the summit, followed the next day by Strang and White. The last pyramid to the top proved to be an extremely difficult technical climb. The snow conditions early in the previous week along the eastern face of the mountain were so bad that this route had to be abandoned, and the team set about climbing the alternative east spur of the north-east ridge. The climb demanded what Hillary called "terrific efforts". For Gill and Jenkinson it was, he says, a 19-hour day.

Sir Edmund did not himself go above 3,400 ft. on Mount Herschel, but later climbed an unnamed peak of 5,500 ft. Herschel, he said, had proved "a damned sight steeper than it looked", and the planned dual assault had had to be abandoned. The eastern face proved on close inspection to be "right out of the question". "We learnt a lot," Hillary said, "and one thing was not to trust aerial photographs.

They don't show very much of the complications at ground level. We found many hidden crevasses."

BACK TO HALLETT

Abandoning the originally planned geological survey of the Ironside Glacier north of Mount Herschel, the party now made its way back to Hallett Station, where it was joined by Dr. Harrington, who had been delayed in South America where he had been attending an international conference on Geology.

Bad weather and engine trouble immobilised the party at Hallett for several days. A new ignition coil and a condenser for one of the toboggans had to be flown from Scott Base. When weather and toboggans recovered, the party, now nine strong, moved north from Hallett on November 2 across the sea ice, camped off Helm Point and again just north of Quartermain Point. They now got on to the Moubray Piedmont Glacier, still moving north towards their objective, Robertson Bay, camped below the Adare Saddle and then on the Saddle itself, on the isthmus of the Adare Peninsula, between Moubray Bay and Robertson Bay.

The planned scientific programme on the Ironside Glacier (72°08'S, 169° 40'E) which flows into Moubray Bay between the parallel ridges trending W.N.W. from Mt. Herschel and Mt. Sabine, was abandoned. A member of the party states that inspection showed the lower part of the glacier to be "impossible": crevasses and icefalls made it a veritable "hell of ice". A radio link was established with Scott Base, but a blackout caused by an ionospheric absorption event prevented radio communication of any kind for ten hours. On the morning of October 29 Sir Edmund's call sign was heard at Scott Base, but nothing else. Then bad weather and motor toboggan engine trouble prevented any further movement until a new coil and condenser were flown from McMurdo to Hallett Station.

Professor Harrington described his geological programme as the

completion of the geological and topographical regional reconnaissance commenced by his team in 1957-58: detailed study of the sedimentary structures of the Robertson Bay Group to determine the environment and mechanism of deposition, and the direction of the source area of the sediments: detailed study of the zig-zag cleavage folds or kink folds which are characteristic of the Robertson Bay Group; and general study of the sections between Quaternary glaciations and their geomorphological effects.

From here five men (Hillary, Harrington, Hancox, Gill and White) attempted to get through to Robertson Bay without success; but the geologists were able to work in the Cape Klovstad area until an approaching blizzard drove both parties back to the camp below the saddle which they reached just as the blizzard broke.

This storm lasted for six days, and it was not till November 17 that the party arrived back at Hallett. On the 20th they were flown to Scott Base and they returned to New Zealand next day.

COUNTING SEALS

After laying the depot for the Rennick party on November 9, the Hercules put in on the sea-ice runway at Cape Hallett to land a zoologist, Ian Stirling, of the University of Canterbury, and his assistant, R. Cowan. Stirling will undertake an annual count of Weddell seals in the area as part of his study of the population dynamics of the mammal.

A Canadian graduate, Stirling is completing a Ph.D. on the Weddell seal. He will be assisted by D. Mossop, an honours student in the zoology department.

The men will be attached to Scott Base and will work in the McMurdo Sound area. During the summer Stirling will also make a check of Weddell seals banded in previous seasons between Scott Base and Cape Hallett.

RENNICK-LILLIE GLACIER TEAM IN THE FIELD

The major geological and survey expedition to be mounted by New Zealand this summer has begun operations in the Rennick-Lillie Glacier area* of Northern Victoria Land.

D. G. Massam, a mountaineer who has climbed in many parts of the world, including Peru, the United States and Canada, is the leader.

Others in the party are M. J. Sheehan, deputy field leader; J. A. S. Dow, senior geologist; V. E. Neall, geologist; G. R. Champness, field assistant; and J. Glasgow, also a field assistant.

Mr. Glasgow replaces G. Dingle, who was injured in a climbing accident in New Zealand.

Both Massam and Sheehan have participated in earlier field journeys.

For three months, the party will explore 6,000 square miles of mountainous and extensively glaciated terrain in search for a relationship between coastal and inland rock formations. Most of the work will be done in the area east of the Upper Rennick Glacier.

DEPOT LAID

After three attempts, a large food and fuel depot for the New Zealand programme was set up on November 9 in one of the most inhospitable regions of Antarctica by a U.S. Navy ski-equipped Hercules, which became the first aircraft to land in the area.

The depot is on the Leap Year Glacier, Northern Victoria Land, 71°42'S., 164°15'E., 400 miles north of Scott Base and about 150 miles from Cape Hallett, where Sir Edmund Hillary and his scientific and mountaineering team were then working.

The first attempt to land on the Leap Year Glacier was made on

November 6, but was foiled by low cloud.

Again, next day, the Hercules was forced to return to McMurdo Sound because of bad weather at Cape Hallett.

After a reconnaissance flight over the mountain ranges between the Rennick Glacier and the Lillie Glacier, where the party will operate, the Hercules touched down and 5,000 lb of cargo was unloaded and cached. A test landing was also made on the Evans Neve, where the party will start the journey.

MEN FLOWN IN

The geological programme began when the party was flown into the Evans Neve to the west of the Rennick in November.

Using three motorised toboggans and six sledges, the men will make their way to the depot over the next three weeks. At the depot a base camp will be established from which the geologists, Dow and Neall, will start examining the area and collecting rock samples.

The party's main objective is to investigate the relationship of Robertson Bay rock structures, near Cape Hallett, to those in the Bowers Mountains and Rennick Schist. Some of the work is complementary to that done by Dr. H. J. Harrington, a world authority on Antarctic geology and a member of Sir Edmund Hillary's party. He is Hillary's brother-in-law.

Now they are in the field the men will be isolated until the end of January next year. Their only communication will be by radio and one aircraft flight in mid-December, which will resupply the party with food and fuel.

Massam said that although the assignment was a tough one the information it would yield made it extremely worth while.

'Crevasses will be a big problem,' he said. 'Over really dangerous country one of us will walk out in front and sound out a safe route.'

Although the comforts of home will be far away for the six men, Christmas Day will see a primus cooked dinner served with wine.

* See outline of the discovery and early exploration of the area, and a map, on pages 542-546 in our last (June) issue.

THE SKUA AND THE PENGUIN

NEIGHBOURS AT CAPE BIRD

A nature study film, being made on the relationships of the Adélie penguin and the McCormick skua by New Zealand zoologists, will have its premiere at an international symposium on Antarctic biology at Cambridge University next August.

The zoologists, from the University of Canterbury, are Dr. E. C. Young, leader, A. J. Peterson, E. B. Spurr, and M. Williams. The photographer is J. T. Darby.

The documentary will later be adapted for a television series and screened in many parts of the world.

The film was started last year at a large and undisturbed penguin colony at Cape Bird, on the northern tip of Ross Island, and will be completed early next year. The skua rookery is the only one on Ross Island, and overlooks the penguin colony.

SKUA AND PENGUIN

The unit has been studying the effect of skua predation on penguins for two years. The zoologists were flown to Cape Bird in mid-November by a U.S. Navy helicopter for what will probably be the last season. This is the only detailed study of its kind being carried out in Antarctica.

"We want to know how dependent skuas are on penguins for food, and what effect they have on their breeding success," Dr. Young said. "Skuas eat penguin eggs and chicks, but we don't know if they feed on them exclusively."

The zoologists are anxious to learn more about penguin and skua chick mortality, and also hope to determine the importance of nesting in the life cycle of the skua.

Adult penguins are hunted by leopard seals, whose viciousness even towards man is legendary, and the men hope to find out more about the frequency and effects of these attacks.

U.S.-N.Z. CO-OPERATION

Much of the work being carried out by the unit is complementary to a long-term programme on penguin population being done by the eminent American zoologist, Dr. W. S. Sladen, of the Johns Hopkins University, Baltimore. Dr. Sladen is working at Cape Crozier, on the south coast of Ross Island, and the two parties are in constant radio communication.

Dr. Young said Cape Bird was probably the only place in the world where the relationships of two animals could be so closely studied in their natural environment. There were no complicating factors.

"The results of our studies will have universal application," he said.

"It seems clear that in the future penguin and skua are going to require some conservation measures, and the unit's work will go a long way in providing a scientific basis for them."

SPECIALISTS

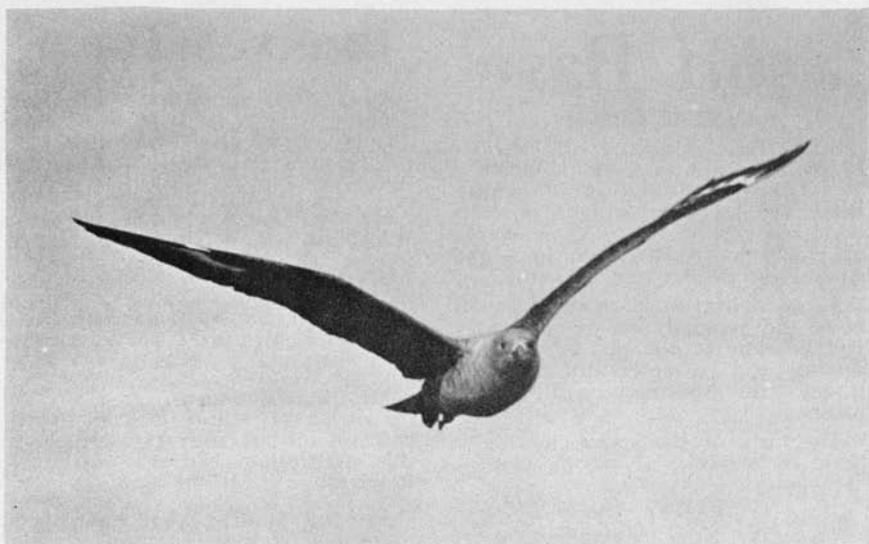
Dr. Young will continue his researches on the Antarctic skua, and the Adélie penguin. It will be his fourth working summer in the Antarctic.

Peterson, who is going down for his second season, is the holder of this year's bursary awarded by the Canterbury branch of the New Zealand Antarctic Society. He will investigate hormones in the blood of Adélie penguins.

Williams is doing a master's degree on the skua and will study the mortality of skua chicks. Spurr will study Adélie penguins, particularly the formation of colonies.

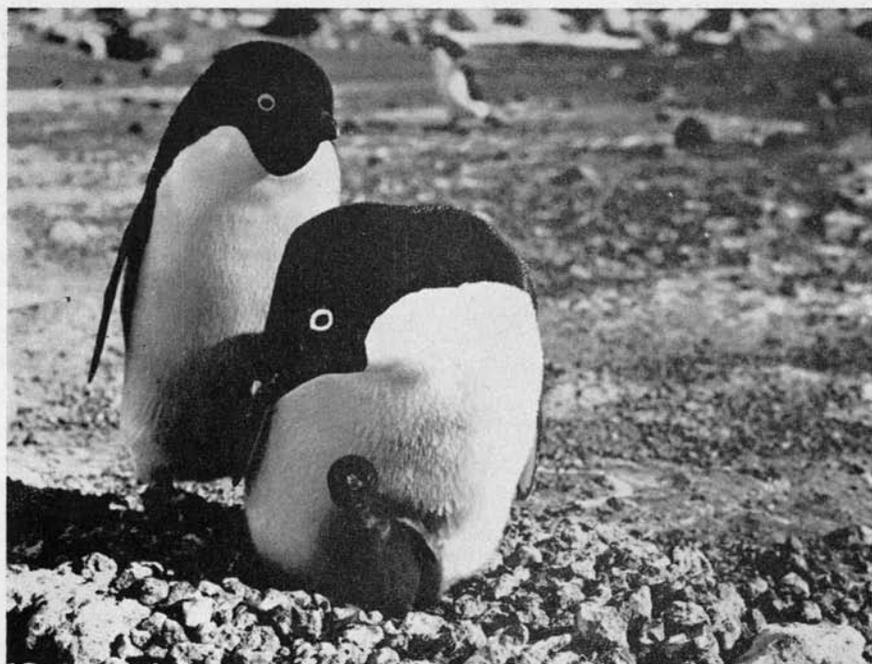
Darby is another veteran of three summers.

Apart from deliveries of mail the party will not be disturbed for the 18 weeks it is in the Antarctic. This is in the interests of not upsetting the rookery by unnecessary helicopter flights.



COMING IN FOR THE KILL?
A Skua attacks

Photos: J. T. Darby



PROUD PARENTS
Adelie Penguins and Chick

Scott Base

ANNUAL CHORE

Scott Base reported on October 24 that the annual task of clearing away the accumulation of winter snow around the complex of huts was under way. It took six weeks of work before the buildings and surroundings were clear of snow.

Some drifts were more than 8ft high and reached up to hut roofs. If the snow is not cleared it melts during the summer thaw, seeps under the buildings and freezes into hard ice.

The bulk of the snow clearing is done by shovel.

FIRST IN

The first New Zealanders to go south after the 1967 winter were the Superintendent of the Antarctic Division, Mr. R. B. Thomson, and the new Scott Base Leader W. J. Webb, who both flew in on the first United States Hercules aircraft on October 2. The next members of the New Zealand party to arrive at Scott Base were Johnson, Henderson, Fergusson, Wratt and Edlin of the 1968 wintering team, with Smith (dep.-leader) and Procter of the summer party.

New Zealand's own vessel, H.M.N.Z.S. "Endeavour," is scheduled to sail south on January 4, 1968.

Because two American ice-breakers, "Burton Island" and "Westwind," were ahead of schedule, a New Zealand vehicle convoy would have been prevented from returning from Cape Royds to Scott Base if the ice-breakers had not considerably halted their work. The Kiwis had taken a new emergency hut to Cape Royds to replace the biological hut there, and were about to return to Scott Base with the existing hut when the Americans began "breaking" across the convoy's route, earlier than had been expected.

The biological hut (lab. and living quarters) is to be erected at Lake Vanda.

FIRST MAORI?

R. J. (Bob) Sopp, one of the New Zealand winter party at Scott Base this year, is the first Maori to winter at a New Zealand Antarctic Base.

He is, however, not the first Maori to winter in the Antarctic.

Dr. L. H. Potaka, a graduate of the Otago Medical School, spent a winter at Little America with Rear-Admiral R. E. Byrd's second expedition thirty-two years ago.

Mr. R. Nicholson, a Hamilton carpenter of Maori descent, spent last winter in the Antarctic with the Australian National Antarctic Research Expedition.

Several Maoris also have been members of New Zealand summer parties.

Bob Sopp was the diesel engineer at Scott Base last winter. Twenty-five years of age, and married, with one son, he was born in Wairoa, Hawke's Bay. He received his primary education at Tuai, near Waikaremoana, then attended Wanganui Technical College as a boarder, gaining school certificate.

He joined the New Zealand Forest Service as an apprentice automotive diesel engineer, and has worked continuously at Kaingaroa, until he was selected as one of the twelve wintering over personnel for the tenth New Zealand Antarctic Research Expedition.

At Scott Base Mr. Sopp has had complete charge of the 65 kilowatt diesel generating plant which supplies all the power for the base.

He is a keen skier and outdoor man and has made various trips in the Antarctic with dog teams or motor toboggans. Indoors he has been an asset socially as a guitar player both at Scott Base and among the Americans at nearby McMurdo Station.

He carved a fine Maori teko teko during the long winter darkness. This was presented, as a token of goodwill, to the Chief Petty Officers'

Mess at McMurdo where it now occupies pride of place. He is also a keen chess player.

When he returned to New Zealand in October Mr. Sopp resumed employment with the Forest Service at Kaingaroa.

SWEARING IN: ON THE SPOT

Instead of the new leader Scott Base being sworn in at Wellington in the warmth of the Governor-General's office, the ceremony was carried out for the first time by the stipendiary magistrate of the Ross Dependency, Colin Clark, in sub-zero temperatures. As stipendiary magistrate of the dependency, Mr. Clark passed that office and those of Justice of the Peace and Coroner to his successor, William J. Webb. After the swearing in, Mr. Clark lowered "his" flag and Mr. Webb raised a new one. Mr. Clark will keep the flag he lowered as a personal memento. Mr. Clark, who with 11 others has served for a year in Antarctica, was able to swear his successor into office because he had been vested with the title and powers of stipendiary magistrate of the Government of the Ross Dependency. He was the first leader at Scott Base to hold this appointment.

Another first was made when G. R. Edlin of Invercargill took an oath that made him full-time postmaster at Scott Base. Previously his duties were delegated to officers of the New Zealand Antarctic Expedition.

For some of the incoming party it was their first full day in the Antarctic, and although the temperature was equal to about 70 degrees of frost, nobody went indoors until the ceremony was over.

THIS YEAR'S SCOUTS

The Queen's Scouts selected for work in the Antarctic this summer are:

Thomas Brummer, New Plymouth
Kelvin Walls, Hastings
Stephen Hills, Auckland

FIRST N.Z. WOMAN GOING SOUTH

On the first tourist cruise to the Ross Sea sector of Antarctica, the tourists will have among their guides and advisers **Mrs. Marie Darby**, a marine biologist at Canterbury (N.Z.) Museum. This will constitute another "first," as Mrs. Darby will be the first New Zealand woman to set foot on Antarctic land.

Very few women at all have visited the Antarctic. Only two have entered New Zealand's Ross Dependency. These were two American air hostesses, Patricia Hepunstall and Ruth Kelly, who spent about three hours at McMurdo on October 15-16, 1957, when a Pan-American Airways Stratocruiser made the first commercial flight from Christchurch to McMurdo Sound.

Mrs. Darby will make a much longer stay. A Wellington girl, she took a B.Sc. degree at Victoria University and completed an honours and a master's degree at Canterbury. She has specialised in ichthyology.

The Antarctic tour will be Mrs. Darby's first expedition, but she spent a year at the Portobello marine biological station and has been on several study trips in Cook Strait.

To visit the sub-Antarctic islands and Antarctica has been a cherished wish for Mrs. Darby since long before she met her husband. Now an added interest will be that Mr. Darby, a biological photographer for the University of Canterbury, will be staying at Cape Bird from December to February.

Mr. Darby has been to the Antarctic twice before. His many slides and photographs of marine life have been of great help to his wife in her work.

She will be a guest on board the "Magga Dan" and may accompany both of the tours planned. As well as studying certain types of fish, Mrs. Darby will make a check list of sub-Antarctic birds for the information of tourists on board and will give lectures and act as a general adviser.

ICE SHELF WORKERS TRAPPED BY STORM

Scott Base reported on November 11 that a howling blizzard had trapped five New Zealanders on McMurdo ice shelf. The men were working on a glaciological project and were a day out of Scott Base when the blizzard struck.

They dared not step outside a Sno-cat and two field caravans, their only protection against the ravages of the screaming winds.

The Sno-cat, one used by Sir Vivian Fuchs on the 1958 Commonwealth trans-Antarctic expedition, had left Scott Base on October 28 to lay fuel depots for a summer project on the McMurdo ice shelf.

Six dumps of fuel will be established at strategic localities on the 1,200 square miles of ice shelf.

Members of the party are two surveyors, W. Lucy and N. G. Pitts, and R. V. Barton, field assistant. The leader, A. J. Heine, joined the party during the first week of November.

When the fuel depots have been laid the men will inspect the seven marker beacons that overlook the McMurdo ice shelf from surrounding landmarks. If any are damaged or missing they will be replaced by new ones flown in by U.S. Navy helicopter.

McMurdo ice shelf has been intensively studied for four years in the area between Ross Island, Black Island, White Island and the mainland. The object is to measure the rate and direction of ice flow, the increase and decrease of snow levels at various points, and the mechanics of summer ice breakouts in McMurdo Sound.

Previous study has revealed much about the general characteristics of the ice shelf, and this season more detailed measurement of strain, direction and speed will be carried out. A feature of the programme will be the initiation of contour-mapping work, covering the Western portion of the ice shelf between Scott Base and White Island.

Information gained from the study is invaluable to the United States Navy's Antarctic support

force, for it enables movements of the Williams Field ski runway to be calculated well in advance.

BLIZZARD HALTS WORK AT BASE

The storm brought all summer field activities to a halt.

From Scott Base Brent Procter reported that four members of Canterbury University's Antarctic biological unit were to have been taken to Cape Bird by helicopter to study Adélie penguins and the McCormick skua gull. This flight was postponed.

At Scott Base there was no movement outside, and snow drifts, some many feet high, soon built up. Winds of more than 60 miles an hour were recorded.

In a short but strikingly illustrated and presented article in the November "National Geographic," Admiral Abbot tells of the first scheduled winter flight from Christchurch to McMurdo on January 18.

"Our load exceeded normal maximum take-off weight by seven tons. Besides 22 passengers we carried 5,022 pounds of mail, bales of newspapers, 2,920 pounds of fresh vegetables, eggs and milk, and twelve dozen cookies baked by women of the New Zealand Antarctic Society for their countrymen at Scott Station near McMurdo."

Good work, Canterbury branch!

EXPORT HERRINGS

About 800 lb of New Zealand herrings will be exported to the Antarctic this summer. They are needed for a research project involving penguins at Cape Hallett.

Christchurch fishermen will supply part of the order and a Nelson firm will supply 500 lb, said a spokesman for the United States Antarctic research programme.

A number of penguins will be kept in an enclosed area for observation. The New Zealand herrings will be sent down as food for the birds.

The fish were frozen in blocks and shipped down to the Antarctic early in November.

SIXTY SCIENTIFIC PROJECTS PLANNED FOR DEEP FREEZE 68

DEEP FREEZE 68 swung into operation on October 2 when aircraft from the U.S. Navy's Task Force Forty-three opened the thirteenth summer of Antarctic activities.

FIRST IN

Two Hercules and two Super Constellations left Christchurch on the 2,300-mile flight to McMurdo on October 2.

The planes took about 200 men, cargo, and about 4,000 lb of mail.

Aboard the first Hercules was the commander of the United States Navy Antarctic support force (Rear-Admiral J. L. Abbot), Captain H. Kelley, who will be in command at McMurdo Station, and five staff officers. Also on board were Mr. R. B. Thomson, superintendent of the Antarctic Division of the Department of Scientific and Industrial Research, and Mr. W. J. Webb, the new Scott Base leader.

The Hercules landed on the skiway on the Ross Ice Shelf, and the Super Constellations on the ice runway. Both landing strips were in good condition.

The picket ship U.S.S. "Calcutta" was on station midway between New Zealand and the Antarctic.

By November 1, after the first aircraft, a Hercules, to get to the South Pole Station for eight months, had paused briefly in the minus 60° temperature to off-load its cargo, all but one of the U.S. stations had been opened. Plateau Station was expected to be reached within about two weeks.

Some 60 scientific projects are planned by the National Science Foundation during the coming season, the major one being the deep ice coring programme described elsewhere in this bulletin. The Marie Byrd Land coast investigation, started last year, will be continued, the dry or ice-free valleys studied for primitive soil formation processes, meteorology and upper atmosphere physics further studied.

About 150 U.S. scientists will be at work in the Antarctic between October and March next year, and more than a dozen ships and aircraft, with nearly 2,500 men, will be used to provide supplies and transportation for them and the supporting teams.

SUPPORT

November saw the U.S. Coast Guard ice-breakers "Glacier," "Southwind," "Burton Island" and Arctic veteran "Westwind" start work on the clearing of a channel through the ice at McMurdo Sound, thus opening the way for other ships and tankers carrying support materials for Deep Freeze 68. Rear Admiral J. Lloyd Abbot, Jr., U.S.N., commands this year's U.S. Naval Support Force and Task Force 43, his command including ships from the Atlantic Fleet, as well as the Antarctic Support Activities, R.I., the Air development Squadron SIX, Quonset Point, the Construction Battalion Unit 201, R.I., an Army Aviation detachment from Ft. Eustis, a Naval Nuclear Power Unit from Ft. Belvoir and the Coast Guard ice-breakers.

"Burton Island" will not only break ice; meteorological and oceanographic research will be conducted as well.

Other vessels already, in November, operating in Antarctic waters included the tanker "Alatna" and the supply ship "John R. Towle."

THE PICKET SHIPS

The first picket of the 1967-68 Deep Freeze season was, it is to be hoped, the last gasp of winter rather than a foretaste of the summer to come. Pounding seas, some reaching a height of 50 ft., during

the first U.S. picket ship's first station keeping for the season, had damaged "Calcaterra's" superstructure, as was clear when she returned to Dunedin on October 11. Fortunately the turbulence caused no more than minor injuries to crew members before "Calcaterra" was relieved by U.S.S. "Mills."

McMURDO

McMurdo Station this season offers many innovations, built during Deep Freeze 67. The new personnel building, not yet completed, won the erection of the building shell and foundation work on the utilities for the single-story portion of the structure which are expected to be finished this season. When complete the facility will provide living quarters for 257 persons in one- and two-man rooms for 21 officers, three-man rooms for 24 petty officers and four-man rooms for 212 enlisted men. A galley to feed 1,000 persons with two serving lines, seating 272 men a sitting, a large, modern laundry, toilet facilities, a ship's store, a barber's shop and lounges will make this the largest structure in Antarctica, measuring 318 feet by 165 feet, with a total floor space of 68,000 square feet.

Much-needed maintenance facilities were provided last season by the construction of the public works and transportation centre, a two-storey building within a building of 122 ft. by 112 ft. The inner building houses offices, engineering and storage space and machine, metalworking and carpentry shops; the floor space not incorporated in this section will serve as a vehicle and equipment maintenance shop.

This season is expected to see the completion of a second VX-6 warehouse and VX-6 shops and offices, together with the demolition of the temporary buildings they will replace; this, too, should make a noticeable change to McMurdo's appearance.

POLE

In temperatures of minus 60 degrees a Hercules of the United

States Navy Antarctic Support Force flew to the South Pole Station on September 27. It was the first flight to the station for eight months.

The aircraft landed at 2.55 p.m. and remained on the ground only long enough to unload fresh provisions, mail and stores.

The 29 men on board the aircraft included replacements for some of the 22 men who spent the winter at the station, and the deputy commander of the Antarctic Support Force (Captain A. F. Farwell), the Antarctic representative of the United States Antarctic Research Programme (Mr. J. Huffman) and the commander of Antarctic support activities (Captain H. A. Kelley).

From now until the end of the season at least one flight will be made to the polar station every two days. All will carry cargo and fuel to re-supply the station for the next winter.

FLIGHT TO PLATEAU

A United States Navy ski-equipped Hercules landed at Plateau Station, 1,350 miles from McMurdo Station, just before midnight on November 17. For the eight men at the small base it was their first physical contact with the outside world for 10 months.

There had been three earlier postponed flights. The Hercules had on one occasion actually flown above the station for an hour, but poor visibility and ice fog prevented a landing.

The Hercules remained on the ground at Plateau Station until 1.30 a.m. on Saturday. It returned to McMurdo Station at 6.30 a.m.

There were five reasons for the flight: to deliver the first mail at the station for 10 months; to take in fresh produce; to deliver the four Navy men and four scientists who will spend the next 10 months there; to deliver two technicians to prepare vehicles for the Amundsen-Scott South Pole Station land traverse; and to take in the Navy task force commander (Rear Admiral J. L. Abbot).

SCIENCE PROJECTS

The approaching period of maximum solar activity will also produce a major research project this year in the Antarctic. Dr. James R. Barcus of the University of Denver will release balloon-borne instruments to detect auroral and solar electrons and solar nuclear particles. A tentative flight programme includes 15 launches from Byrd Station and five from McMurdo between December 25 and February 15, with the balloons flying to 50,000 feet and carrying radar reflectors for identification as well as self-destruction mechanisms which will be activated should a balloon fall to an aircraft-route altitude. Vital information about interplanetary conditions and particle entry into the terrestrial field is expected to be provided by this study.

Other projects will continue studies from previous years—ionospheric phenomena, magnetism and gravity, weather and climate, submarine geology, behavioural, biology.

The theory of continental drift is one possible answer to the phenomena of evidence that interior Antarctic areas were once exposed to warm or even tropical climates. Three geological projects this season will concentrate on the continental drift possibilities, and another dozen or more will be of more conventional geological study.

"ELTANIN"

The Antarctic research ship "Eltanin" entered dry dock in San Francisco in September, her first U.S. landfall for five years. "Eltanin" left New York in 1962 and has, since then, spent 1,526 days, or 77% of the time, at sea, mostly in the high latitudes of the South Pacific Ocean, with brief visits to ports such as Valparaiso and Punta Arenas in Chile or Wellington in New Zealand.

With an average complement of 35 scientists per cruise, "Eltanin" has activated research in marine biology, oceanography of both physical and chemical nature, marine geology, geophysics, upper atmosphere physics, meteorology,

ornithology, and nearly every discipline connected with Antarctic research. Her scientists have come to her from some 20 U.S. universities, non-profit research organisations and Government agencies, as well as from 10 other countries.

After a two-month stay in dry dock and shipyard for a complete check, renovation and provision of improved scientific facilities, "Eltanin" will leave for southern waters again, principally in the high latitudes of the Indian Ocean, where she will operate for the next few years.

NAMES RESTORED

More than 8,500 names for Antarctic geographic features have been accepted by the Board of Geographic Names, names put forward by the U.S., Australia, New Zealand, the U.S.S.R., Japan and Norway, and a cumulative gazetteer of standardized names issued. Three official returns have been made to former names, these being Byrd Land, which is now again to be named Marie Byrd Land, Byrd Mountains, now Harold Byrd Mountains, and Ronne Ice Shelf, now the Edith Ronne Ice Shelf.

The five-man team of U.S. Observers which completed an inspection of eight Antarctic stations under the terms of the Antarctic Treaty last summer reports that each of the eight stations operated by seven different countries to which the Observers went extended a warm welcome, complete co-operation and full explanations of all programmes. No indications were seen that nuclear energy was being used, even for peaceful purposes; the only weapons seen were a few small arms used for limited purposes under controlled conditions; all stations observed were adhering to sound principles for the preservation of natural life and no indications of any Treaty violation were observed.

The spirit of the Antarctic Treaty has survived the seven years since its inauguration, despite any changes in government and international political climate.

MAJOR TRAVERSES

The South Pole-Queen Maud Land Traverse III party will undertake the third leg of the projected 5,000-mile, 4-year traverse which began, from the South Pole, in the 1965-66 season. Traverse III will pick up from where last season's traverse stopped.

Leader of Traverse III will be Norman W. Peddie of the U.S. Coast and Geodetic Survey who replaces the scheduled leader, Dr. Charles R. Bentley of the University of Wisconsin, now unable to take part. Geophysicists will determine the thickness of the ice and study the characteristics of the ice sheet and bedrock interfaces; three glaciologists from Ohio State University will continue studies of the characteristics of surface snow of the polar plateau and will be working with a Norwegian exchange scientist from the Norsk Polar-institut, Yngvar Gjessing.

Mr. Peddie, as well as being leader, and traverse navigator, will conduct magnetic investigations.

Marie Byrd Land will also be asked to disclose some of her secrets, to a multi-discipline integrated survey on its second season along the coast.

Five separate research projects, all supported by turbine helicopters of the U.S. Army Aviation Detachment, will involve 12 scientists led by long-standing Antarctic veteran, Dr. F. Alton Wade, whose first acquaintance with the Antarctic continent was made in 1933 in company with Admiral Byrd.

Texas Tech geologists will survey eastern Marie Byrd Land, attempting to relate the mountains of this area to the Transantarctic Mountains and to the Ellsworth Mountains near the base of the Antarctic Peninsula; topographic engineers from the U.S. Geological Survey will obtain data for aerial mapping along the coast; primitive vegetation, in the forms of lichens, mosses and freshwater algae, found on the ice-free highlands and nunataks, will be surveyed by a team under

the leadership of Dr. Derry Koob from Ohio State University; seeking confirmation of the continental drift from Gondwanaland theory, a scientist from Washington University (St. Louis) will collect rock samples for their magnetic traces and make detailed paleomagnetic investigations; from the University of Chile, Oscar Gonzalez, who is to accompany the Marie Byrd Land survey, will study the history of early vulcanism of the area and see if he can correlate this data with previously obtained data from studies of volcanic activity in the Andean Cordillera, South America, the Shetland Islands and the Antarctic Peninsula.

LLOYD BERKNER

The ranks of surviving members of the first Byrd Expedition of 1928-30 were further diminished with the death in Washington, D.C., in June this year of Dr. Lloyd Viel Berkner, the proposer of the International Geophysical Year (1957-58).

Dr. Berkner, after graduating B.S. in electrical engineering in 1927, joined the Byrd Expedition in 1928 as radio engineer aboard one of the expedition's two ships, "City of New York." During his time with the expedition he flew with Admiral Byrd for the four-hour, 400-mile Fokker flight during which approximately 65,000 square miles of Antarctic terrain were observed.

It was Dr. Berkner who, in casual conversation in 1950, suggested a third polar season to extend work performed during the 1882-83 years, this time during a time of maximum solar activity. One of the group to hear this suggestion was British geophysicist Dr. Sidney Chapman, and he and Dr. Berkner carried the suggestion further. Thus was born I.G.Y.

A naval aviator, Dr. Berkner had attained the rank of Rear Admiral, U.S.N.R., in 1955 and had been the recipient of many awards including the Legion of Merit and several honorary degrees.

EXCHANGE

Exchange scientists conducting research at foreign stations in the Antarctic or co-operating with other nationalities there are many.

The recent winter saw P. G. Astakhov, from Leningrad, working on upper atmosphere physics at the South Pole Station, with another Soviet exchange scientist expected to winter-over during 1968 at one of the U.S. stations. Five USARP upper atmosphere studies are being conducted from Vostok, while Vostok's conjugate in the northern hemisphere is the Danish Arctic station in Greenland, where also U.S. scientists are at work.

Dr. Victor P. Hessler (University of Alaska) and John H. Taylor (National Bureau of Standards) plan to visit Vostok this summer to conduct further upper atmosphere and terrestrial physics studies and to overhaul U.S. equipment being operated by Soviet scientists. At Molodezhnaya, U.S. exchange scientist at present is Dr. E. Everett McNamara of the Arctic Institute of North America, to be succeeded by St. Louis' Washington University Dr. H. Leroy Scharon, paleomagnetist, for the 1968-69 Antarctic winter and summer.

Other exchange scientists include Dr. William L. Boyd (Colorado State University) at Almirante Brown, the Argentine station; Dr. T. W. Gevers from the University of Witwatersrand, Johannesburg, who will accompany two U.C.L.A. scientists in their paleogeographic studies of the Antarctic; from the University of Brussels, N.S.F. will support Dr. Edgard E. Picciotto, a glaciologist; Dr. Oscar Gonzalez from Chile will accompany the Marie Byrd Land Survey, and another Chilean, Javier B. Sarat, will visit U.S. stations to study techniques used for the exchange of meteorological information between stations; Yngvar Gjessing of the Norsk Polarinstitut will be a member of the South Pole-Queen Maud Land Traverse III party and Dr. Robert Carrick, Australian biologist, will conduct studies at McMurdo.

NUCLEAR POWER

For economic reasons it was unlikely that nuclear power plants would be installed at American inland bases in the Antarctic, said the commander of the United States Navy Antarctic Support Force (Rear-Admiral J. L. Abbott) in Christchurch on November 29. Any plan which considered nuclear power plants at Byrd and Pole Stations was not justified.

Nuclear power on the continent would only involve the replacement of the present plant at McMurdo Station, which was installed five years ago. It has a life of 30 years.

"We have procured from the Atomic Energy Commission sufficient nuclear fuel to see us well into the late 1970s," said the Admiral.

REPLACEMENT

Long before the life of the existing plant was up it would be replaced by a more efficient, higher-capacity plant.

"I believe that remote automatic weather stations operated perhaps on isotopic power will be especially useful in the Antarctic when it has been fully developed," he said.

Colonel R. L. Ednie, the director of the U.S. Army's nuclear power programme, said that he was satisfied with the plant's performance. Last year it produced power for 3,606 hours.

A new core recently installed in the McMurdo plant has a life of three years. This means that the plant had been refuelled for the second time since it was commissioned.

The second spent core, which was removed, has been immersed in a tank of water at McMurdo, where it will remain for a year to cool down. It will then be placed aboard a ship and taken back to the United States in radiation safety.

The Antarctic Treaty, of course, to which the United States subscribes, lays down stringent regulations regarding the disposal of nuclear waste.

DRILLING THROUGH THE ICE SHEET FOR A MILE AND A HALF

HOW DEEP-ICE CORES MAY REVEAL SECRETS OF THE EARTH'S HISTORY

[Anthony J. Gow, New Zealand born and educated but now resident in the United States, has participated in nine American Antarctic expeditions and has also spent two summers in Greenland. He is a leading glaciologist whose major interests have to do with the physical and mechanical properties and crystal structure of the snow and ice of Polar ice sheets. He has kindly provided us with information from which this note is compiled.—Ed.]

Mr. Gow is at present taking part in a remarkable ice-drilling project at Byrd Station, where personnel of the U.S. Army Cold Regions Research and Engineering Laboratory are attempting to obtain a mile and a half of ice core containing a continuous record of the earth's climate for the past 35,000 years.

Following a successful deep-core ice-drilling programme in the Antarctic during the International Geophysical Year, 1957-58, a thermal drill was used at Camp Century in Greenland during 1961, 1962, 1963 and 1964. Ice cores were retrieved to a depth of 540 m. In 1965, using an electro-mechanical drill, this hole was deepened to 1,000 m. Then on the fourth of July, 1966, the bottom of the Greenland ice-sheet was penetrated at a depth of 1,387 m. (4,550 feet).

AT BYRD STATION

Deep-core drilling was begun at Byrd Station Antarctica, in January this year, 1967. Cores have already been obtained to a depth of 218 m. (715 ft.) using an electro-drill. Drilling through the ice-sheet should be completed before the end of February, 1968.

It is estimated that the ice-sheet at Byrd is between 7,000 and 8,000 feet thick. On November 15 the

drillers had reached a depth of 1,700 feet. The bottom ice could be as much as 35,000 years old.

It is therefore hoped not only to procure by isotopic means the record of snow accumulation over a long period, but to obtain also a record of the environment history of the ice-sheet through studies of the gases, soluble salts and particulate matter entrapped in the ice, and of such physical and structural properties of ice as the density, bubble dimensions and pressure, grain size and shape and crystal fabrics.

The hole itself will be used to measure temperatures and deformation in the ice-sheet. It will also afford an unprecedented opportunity to examine conditions in the vicinity of the bed of the ice-sheet. These will include the nature and magnitude of flow of the basal ice, the extent and mechanism of moraine entrapment, heat flow and bed-rock composition.

"ON SITE" STUDIES

As soon as they are recovered from the drill hole, six inches in diameter, the ice cores (each core up to 20 ft. long and 4½ in. in diameter) will be logged; i.e., a record will be kept of the depth from which the core was extracted. They will also be oriented to indicate "top" and "bottom." The stratigraphy of cores from the top 100 m. will be examined in sufficient detail to obtain preliminary estimates of past rates of snow accumulation. Stratigraphic studies of deeper cores will perforce be restricted to an examination of the ice for discontinuities in the core which might prove useful in determining the environment of deposition, such as melt layers, layers of dust from volcanoes, moraines, etc.

Density measurement will be made as frequently as needed to obtain an accurate depth-density curve. These measurements will be conducted as soon as possible after the recovery of each core. Selected cores will be re-measured later to determine the extent of relaxation of ice following its removal from high-confining pressures. An accurately measured density profile will also facilitate precise calculation of porosity and ice-load.

Bubble pressures will also be measured to determine the range of pressure values among neighbouring bubbles and whether or not equilibrium is ultimately established between bubble pressure and the ice overburden.

The crystal structure of the ice will be examined by sectioning cores at frequent intervals. Preliminary measurements will be made to determine changes in the size, shape and overall orientation of crystals with increasing depth in the ice-sheets. Bubble-crystal relations will also be examined, as any tendency for bubbles or crystals to orient themselves will probably provide the first positive indication of significant shear-deformation in the ice-sheet, i.e., a change in the shape caused by stresses set up by the weight of the ice. In the Antarctic this kind of deformation is probably restricted to layers of ice near the bottom of the ice-sheet.

Preliminary determinations of the relative purity of ice at various depths will be made by measuring the electrical conductance of melted samples. It should be possible to detect relatively small changes in the chemical composition of core samples. Such data could furnish preliminary clues to changes in the past patterns of atmospheric circulation and precipitation over Antarctica.

LABORATORY RESEARCH

These on-site examinations will of course be followed by more intensive study of selected samples from the cores in the laboratory. In addition to re-determination and re-measurements, there will be analysis of the chemical composition of

the ice-cores in order to determine past levels of chemical impurity in the ice, and any significant variations in fall-out of the principal chemical components over the past 35,000 years or so.

The cores will be dated either directly or by indirect means, and it is hoped that this will provide evidence of past accumulation cycles and also of climate changes.

THE ICE AGE

The investigation of air-bubbles trapped in the ice will include analyses of gas composition at various depths.

One of the great earth-mysteries is "What has caused the periodic waxing and waning of continental ice-sheets during the pleistocene period?" One hypothesis to account for this is that variation in the concentration of carbon dioxide in the atmosphere has triggered these changes. Coring to the bed of the ice-sheet at Byrd Station could conceivably furnish a record of atmospheric composition dating back as far as 35,000 years. Since the most recent deglaciation is believed to have occurred less than 20,000 years ago, measurement of gas composition in the deepest ice-cores from Byrd should constitute a unique test of this hypothesis.

METEOROLOGY: 1929-31

Dr. R. G. (Ritchie) Simmers, until recently Director, New Zealand Meteorological Service, was meteorologist on Mawson's BANZARE expedition in 1929-31. He and Dr. R. A. Falla were the New Zealand members of the team.

In August this year he was in Melbourne after four months at the Mawson Institute for Antarctic Research in Adelaide—putting the finishing touches on his Meteorological Report of the 1929-31 expedition. An Australian report says:

"After all those years, Dr. Simmers struck a snag when preparing his Antarctic data for publication. Meteorology has advanced so far in those 35 years that he has had to translate his old figures and observation symbols into a completely new scientific language."

WINTER AT THE SOVIET STATIONS

It was a severe winter at the Soviet Antarctic stations. The inhabited buildings at Mirny were covered by three to four metres of snow and the mercury at Vostok fell to -66.7° C.

Radiograms received from the Antarctic told of the difficult days of the "Polarists." The geophysicists of Mirny counted more than 100 auroras. The seismographic apparatus of the observatory registered during one month 82 earthquakes, mainly from sub-tropical regions, and more than 100 seismic tremors.

A large portion of the observations are taken up by the Antarctic lakes. They play an important role in the supply of water to the station, and ships coming to the Antarctic. The scientists have measured the depths of 27 lakes. From the crystal and deep lakes, bottom samples were taken. Their analysis will enable scientists to determine the age of the lakes, and obtain information about the underwater flora.

AT THE POLE OF COLD

1,410 kilometres from Mirny, in the depth of the Antarctic, at a height of 3,500 metres above sea-level, already in their fifth month, 16 Soviet polarists, headed by the Chief of Station Vostok, Radio Engineer Belyev, continued to spend the winter.

This winter in the region of the "Pole of Cold," in the opinion of the polarists, was "medium severe." The mercury did not fall below -80° C., and the average temperature in July was -66.2° C. For example, on August 17, Leningrad Tass reports, it reached -77° C.

Radiograms reaching Leningrad from the icy continent in August told of the work in difficult and complex conditions performed by the polarists of Vostok.

"Complex observations are being carried out according to plan. Recordings of the temperature of the

air are made with the help of the distant meteorological station. The geophysicist, A. A. Kovalkav, is observing the micro-pulsation of the magnetic pole. Balloons are regularly released into the higher layers of the atmosphere; radio probes are made reaching an average distance of 18,000 metres. The ionosphere is studied, the cosmic rays and auroras.

"Among the wintering party is a doctor/surgeon, and two physiologists who are looking after the health of the polarists and the acclimatisation of humans to extreme climatic conditions."

At the end of the current year, the 10th year of the raising above Vostok of the State Flag of the U.S.S.R. is being marked. During these jubilee days a new group of polarists will be working in the station. It is now being formed in Leningrad, and will leave for the sixth continent with the members of the 13th Soviet Antarctic Expedition. The new group of those wintering at Vostok will be headed by the geophysicist O. N. Struin. The polarists will continue their complex scientific observations and research and will, for the first time in this region of the Antarctic, drill through the icy cover by means of Soviet-built electrothermal drills. This will allow the scientists to obtain data on the formation and origin of the ice shield.

JAPANESE CALL IN

Leningrad Pravda reported on August 25 that a group of Japanese wintering at Syowa Station had visited the Soviet Station Molodezhnaya in Enderby Land.

The whole distance of approximately 400 kilometres was travelled by the Japanese in small tracked vehicles. On the way they conducted observations on surface ice.

The Japanese were met by members of the Soviet Expedition 15

kilometres from Molodezhnaya on August 21. The Japanese polarists, among whom is a geographer and glaciologist, spent two or three days at Molodezhnaya getting acquainted with the scientific work of the wintering team.

Although hundreds of kilometres of icy desert divide them, the men at Syowa and Molodezhnaya are each other's nearest neighbours, and as is customary in similar circumstances they not only exchange radiograms, but the Soviet men working in the Antarctic have visited the Japanese station of Syowa in Queen Maud Land more than once. Here our aeroplanes from Mirny have come, the "Ob" dropped anchor in the harbour of Liutsov-Holm, and at Molodezhnaya, which is situated in Alashev Bay, the Japanese ice-breaker "Fuji" arrived.

PREPARATIONS

Some reports from the Russian Press.

On the turbo-electric vessel "Ob," for the carrying out of the scientific work, six laboratories were being created; microbiological, hydrological, geological, meteorological and others. They were being fitted out in the stern and the bow superstructures and in other parts of the ship. On the right side of the ship five oceanological winches were being installed, and for work with the deep water trawl the stern winch was being modified.

On the decks of the ship, the erection of catapults for transport aeroplanes was being completed. Landing platforms were being made for helicopters. The ship was being equipped with the newest navigational aids and with the latest radio equipment, which allows constant contact with Moscow and other points.

Great attention is being given to the life, work and spare time of the members of the expedition and the crew. With special care the men of the ship-building works are equipping comfortable new cabins. Available to the members of the

expedition and crew will be the main lounge, theatre, library and a place for sport and cultural activities.

V. A. Shamontyev, appointed the leader of the wintering group of this expedition and the Director of the Observatory at Mirny, told a correspondent of the Leningrad Tass:

"In a few weeks 'Ob' will leave for its long voyage, and in its wake a new research ship carrying the name of a well-known Soviet scientist/polarist 'Professor Vize.'

"These ships will deliver the new replacements for the wintering group, and the members of the seasonal groups of the 13th Expedition, which will study geological, radiophysical, hydrobiological aspects of the Antarctic and perform other scientific observations. One of the tasks of the expedition will be to organise the new Soviet Station, Bellingshausen."

SHIPS DEPART

Our latest information is that "Ob" left Leningrad on October 21, some weeks earlier than in 1964 and 1966. Thousands gathered, it is reported, to farewell the members of the 13th expedition. Captain B. Kupri is in command of "Ob."

ARE YOU WITH IT?

Readers will notice that the Russians are using a new word.

The term translated "polarist" is a newly coined word for people of various occupations and disciplines working either in the Arctic or Antarctic.

NEW SHIP

The "Professor Vize," scheduled to leave for the Antarctic on November 18, is the flagship of the Soviet Hydrometeorological Service and is said to be the largest "floating" scientific Institute in the world. It has 29 laboratories. The main subject of study will be the interrelation of ocean and atmosphere.

THE NEW STATION

The fifth functioning Soviet Antarctic Station, Bellingshausen, will be on the Antarctic Peninsula. (Bellingshausen commanded a squadron of two naval vessels which in 1819-21 circumnavigated the Antarctic continent and probably sighted continental land in February, 1820, about three weeks after Bransfield sighted the extremity of the Antarctic Peninsula.)

The 10-man team to winter at the new station will be led by A. B. Budretskiy, a hydro-meteorologist. The wintering party will carry out research in meteorology, hydrology and a complex of geographical work.

The summer party will primarily select a site for the new station. Scientific work will give priority to geology.

The "Bellingshausenovites" will be carrying out stationary research work—meteorological, shore hydrological, and they will also carry out a complex of geographical work. Besides this, the study of the Antarctic Peninsula will be undertaken by the seasonal part of the 13th's expedition, and in particular, the geological group under K. E. Grikurov.

It is obvious that there will be a great deal of work for the research group, the task of which is to find the most suitable place on the peninsula for the actual station.

The builders (a fairly large group), on finishing their work at Bellingshausen, will go on to Molo-dezhnaya, where they will continue to construct various buildings.

It is planned to do a big traverse by tracked sledges from Mirny to Vostok. Into this region of the most severe frosts on earth, deliveries will be made of food, fuel, equipment and clothes, which are necessary for the carrying out of normal work of the new replacements of the scientific team. Other traverses will be made in various regions of the Antarctic.

"FISHING IN THE ANTARCTIC"

A member of the Soviet Expedition, Michael Emelianovich Ostrekin, Hero of the Soviet Union, tells of fishing in the Antarctic.

"During the winter at Mirny, when the Davis Sea was ice-free, we decided to try to catch fish by the usual method—on a hook. The equipment consisted of a bottom rod, with short tracers for the hooks and a light sinker for casting. The bait consisted of small pieces of beef. However, our first attempts were completely unsuccessful until we studied the water depth. It turned out that in the Antarctic, in the same way as in the middle latitudes, fish are much more prone to be caught in the shallows.

"Generally, the fishing was successful during good weather. During such days, in two or three hours the fishermen pulled out from 100 to 150 fish, a bit like 'Bull-head,' and weighing around about 100 and 300 grams. Sometimes there appeared comparatively rare green-coloured fish with an elongated head, and weighing between 200 and 600 grams. In external appearance these looked a bit like sturgeon. We jokingly called them 'Makush' in honour of our biologist, who was the first to catch this fish.

"The well-fried fish was very tasty; the meat was tender—almost boneless. Sometimes fishing was so successful that we sent 30 to 40 kilograms of fish by means of aeroplanes to other Soviet Stations."

RESEARCH SHIP IN WELLINGTON

A Russian research ship, the "Pelamida," arrived in Wellington on November 26 on its way to the Antarctic.

The scientists on board will carry out work in marine biology and oceanography.

The scientists say their chief interest in marine-life studies will be in the behaviour patterns of whales and seals.

The 600-ton ship, built in England, left on November 30. She has 39 men and four women on board. Her ten scientists will carry out oceanographical and marine biological research.

The "Pelamida" has sensitive sonar tracking equipment which has a range of 50,000 metres, and the scientists will use hydraulically-operated lighting gear to study the ocean at great depths. The ship will remain in Antarctic waters until late April and she will then return direct to Vladivostock.

PROTOTYPE FOR FRIENDSHIP

Echoing a sentiment expressed in a recent "ANTARCTIC" headline, the United States Ambassador to Australia, Mr. E. Clark, said after a visit to the Antarctic:

"It is paradoxical that the coldest place in the world can produce the warmest friendship and the most classic example of international understanding, co-operation and brotherhood.

"An altogether unique and admirable kind of international co-operation exists. The jealousies and tensions between nations we read about every day simply do not have a place there . . . The co-operation and sharing of effort that goes on there, the almost total absence of political boundaries or ideologies, make it a potential prototype of the world of the future.

"In the Antarctic, human survival depends on interdependence and co-operation. Every man, no matter what his colour or political creed may be, helps his neighbour. If members of the human race can get together and work together in harmony in Antarctic research and study under the most difficult and trying conditions imaginable, why cannot we do the same elsewhere in space research, atomic energy, defence and international relations?"

Winter Passes in Adelie Land

During the period July-September at Base Dumont d'Urville mean temperatures ranged from 18°C. to 16°C. Winds, blowing normally between means of 36 and 38 km./h., in July reached peaks of 210 km./h. However, work, necessarily indoors, was carried on without respite. In the living quarters, the false ceiling of the kitchen and toilets was fitted up, followed by the fitting of w.c.'s, showers and electrical installations. The library has been newly decorated and there are decorative linings in descotèque, lounge and dining-room.

The renovation of Building 22—formerly store and workshop and summer sleeping quarters—planned for the incoming team to attend to has been completed. All the machines and implements of the base will be grouped there. A 20 m. x 20 building has been constructed parallel with Building 22 to bring together all the reserve food-stocks.

On August 25 the new photometer at the night-sky observation station became operative.

Within the limits of the safety area, a journey on foot over the sea-ice towards Pointe Géologie was organised.

Reconstruction of the community centre has now made available two photographic laboratories, one of which is reserved for professional work.

THE TOURISTS

Provided the tour organizers are willing to comply with the requirements laid down by the New Zealand and United States authorities, it seems that the first trip of the tourist ship "Magga Dan" will leave Lyttelton as planned on January 8 (see September issue, p. 581).

BUSY AUSTRALIAN SEASON PLANNED FOR 1968

With the intention of establishing a party to spend the winter of 1968 on the Amery Ice Shelf added to the normal high level of activity at Mawson and Wilkes, Australian Antarctic interests will be well served during the year.

1967/68 RELIEF EXPEDITIONS

The Antarctic Division has again chartered the well-known ships "Nella Dan" and "Thala Dan" to carry out the relief and resupply of the ANARE Stations. The proposed itineraries of these ships are as follows:

MAWSON, AMERY ICE SHELF VOYAGE

"Nella Dan" will sail from Melbourne on January 5, 1968, carrying the Mawson relief expedition, the Amery Ice Shelf expedition, the summer construction party for Repstat and some supernumerary personnel. The ship will first visit Repstat (near Wilkes) to unload the summer construction party and some building materials. "Nella Dan" will then proceed to Amery Ice Shelf to off-load men and supplies to establish wintering quarters for this small party. "Nella Dan" will next call at Mawson to resupply this station and change over the personnel. On the return journey to Australia "Nella Dan" will pay a second visit to Amery, call at Repstat to pick up the summer construction party and arrive at Hobart about March 19, 1968.

WILKES RELIEF VOYAGE

"Thala Dan" has been sub-chartered from the French to carry out the relief of Wilkes Station. The ship will leave Melbourne on January 8 carrying the Wilkes expedition, the Repstat wintering construction party, and a small number of Frenchmen. "Thala Dan" will first call at Dumont d'Urville to disembark the Frenchmen, then will sail on to Wilkes to off-load supplies for Wilkes Station, building materials and wintering party

for Repstat and to change over the Wilkes personnel. "Thala Dan" is due back in Melbourne about February 20, 1968.

LEADERS FOR 1968

The Officer-in-Charge at Mawson will be **George Francis Hamm** of Hay, N.S.W. Mr. Hamm (36) was educated at St. Patrick's College, Ballarat, and articulated to a Melbourne surveying firm. He has had wide experience throughout Australia as a Consultant Surveyor. Mr. Hamm holds a commission in the Royal Australian Naval Volunteer Reserve and has recently served in H.M.A.S. "Moresby" assisting in hydrographic surveys off the coast of Australia.

The Officer-in-Charge at Wilkes will be **Neil Leonard Brightwell** (26) of Lae, Territory of Papua and New Guinea. Mr. Brightwell graduated Bachelor of Science at Sydney University and holds a Diploma of Forestry from the Forestry School, Canberra. He served for five years as a Forest Officer with the Department of Forests of the Territory of Papua and New Guinea.

OLD HANDS

No fewer than 14 men with previous Antarctic experience are returning to either Mawson, Wilkes, Repstat or the Amery Ice Shelf this coming year.

"NO CHANGE"

There appears to be no change in the position of uncertainty regarding the future of ANARE, the Australian National Antarctic Research Expedition, as outlined on page 556 of our last issue. No permanent appointment had been made as we go to press.

MEANWHILE AT THE BASES

MAWSON NEWS

During August six men made a quick trip to Frustration Dome with the object of retrieving the equipment left behind during the autumn traverse. Manning, Wood and Lawson went straight to the Dome in the Snotrac, pitched a tent and worked three days in extreme cold conditions to mend the broken down machines. Erskine, Jaques and Bishop made slower pace with the dog team and reached the Dome three days later, a blizzard having delayed their progress and kept them captive in their tent for one day, with the temperature at -50°F . On the return journey Manning joined the dog team and Lawson, Wood and Bishop brought the Snotracs back to Fischer independently. Both parties had a fine trip—the dogs and men ran 25 miles on the last day through heavy drift to get back to Fischer Depot ahead of a blizzard. It was on this run that they witnessed an interesting spectacle—an enormous rectangular full moon, white and menacing, slid up out of the ice-sheet like a giant iceberg. They were momentarily startled, till it was realised it was indeed the moon, the effect being due to refraction.

On the last day of the blizzard at Fischer Lawson was in some trouble with his eyes, and Wood and Manning brought him down off the Plateau and back to the Base for the necessary treatment. It was a difficult journey during the night and these two men exercised fine judgment to perform this feat safely.

The Mawson Geologist, Illingworth, has been using elaborate electronic equipment designed in Australia, with which to measure the density of drifting snow. He often complained that there was not enough snow to give it a proper test, but while the field party was away the blizzards deposited much snow on the sea-ice and slopes be-

hind the Base, giving plenty of snow for his drift gauge.

EMPEROR PENGUIN COUNT

In early September Moonie, Cowell and Sharrock, with two teams of seven dogs each, completed a successful journey over the sea-ice to Taylor Glacier to count the Emperor penguin chicks which had lived through the winter. Six thousand chicks were counted which shows that the rookery is holding its own against difficult conditions, although this is a contentious matter among biologists as some say that the Emperor is losing the survival battle. Prior to departure the proposed sites for the night camps were discussed and from the maps it seemed necessary to camp at Einstoding Island, about 35 miles west of Mawson, so that the following day's run across the moving front of the Jelbart Glacier would be as short as possible. On arriving at Einstoding in the afternoon, they found the low island covered with frozen salt sea spray, the rough surface making it impossible for a camp site. It was decided not to go back against the wind but to press on and make the difficult crossing in front of the glacier without delay. A safe crossing was made, and in the gathering darkness they found an excellent camp site on the SE corner of Ufs Island, about 15 miles further west. The dog teams were easily driven straight up a little gully between pressure ridges on to deep fresh snow. The party covered more miles daily than had been expected, and almost made sea-ice travel with dogs seem too easy.

SPRING PARTIES AWAY

A party led by Illingworth put a depot of fuel near Mt. Twintop—a big job entailing much planning and preparations but accomplished with ease and skill. Three caterpillar tractors were used pulling strings of sledges. They made a quick run to Twintop, established a depot at the foot of the mountain and were back in a week instead of the fortnight expected. They had few difficulties, ploughed

untroubled along the treacherous snowy corridor between the Masson and David Ranges, and crossed the crevasse fields in Hordens Gap, breaking through only once.

The big spring trip of 150 miles south, 6,000 feet up on to the Plateau, has left the base. Led by Manning, with Butler, Little, Forecast, Thomas, Jackson, Kerr and Lockhart, the party took a train of three caterpillar tractors, and ten sledges. They had much trouble with the first steep climb when one sledge, loaded with 30 drums of fuel, became detached and crashed back down the slope, stopping just in time at the edge of the ice-cliffs. Good weather was experienced most of the time and when they reached Depot A, at 6,000 feet altitude; Kerr and Lockhart left the train and set up a micropulsation experiment base. Lockhart is also setting up his mobile meteorology station, made and assembled at Mawson, for recording weather observations, temperature, pressure, wind velocity and direction. Little and Thomas left the train, temporarily, when they reached the ice slopes near Mt. Twintop. They erected a tent in the snow at the foot of the mountain and spent a week sitting on the mountain top every day with heliograph, theodolite and tellurometer, awaiting a signal flashed by Manning from 40 miles further on at a point on top of an ice dome previously seen from a distance, but which had not yet been climbed and on which he hoped to set up a survey station.

SURVEYORS RETURN

On October 17, after nearly three weeks on the Antarctic Plateau, the four-man party returned to the station at Mawson. The party carried out a major mapping survey between Mawson and Church Mountain, 90 miles to the east. The survey was the continuation and completion of an earlier attempt interrupted at the beginning of last winter by severe blizzards and weather conditions which forced the previous party reluctantly to return to base and safety.

The recently-returned expedition, which travelled in two snowtrac vehicles, was led by Manning, surveyor, who had as his companions Little, electrical mechanic, Wood, mechanic, and Gillies, radio technician.

On this last field trip, the survey party concluded valuable work which enables the accurate mapping of a group of rocky mountains in this area to be completed. The men safely negotiated crevasses up to 30 feet wide and hundreds of feet deep and re-occupied the polar pyramid tent which had withstood the storms of last winter at a point called "Frustration Dome."

Gillies, Manning, Little and Wood made the long trip to Frustration Dome for the third time to finish a survey using the tellurometer. The whole Antarctic ice-sheet is moving out to sea at the rate of a yard per month, so the survey had to be completed once it had been started from the rock at Church Mountain to the rock at Mawson, or it must all be done again. For the final shot, Little and Wood camped 30 miles out on the Ice Plateau with one set of instruments while Manning and Gillies worked from the top of Onley Hill with the master tellurometer and theodolite, and a third party was stationed on Bechervaise Island with a heliograph. Had difficulties been experienced with weather, communications or instruments, the parties would have had to get their positions again. With six men, six instruments and three tented camps to organise in unpredictable Antarctic conditions, surveyor Manning often had an exasperating task.

Geologist Dent and Jaques climbed Painted Peak (northern tip of the Masson Range about 10 miles south of Mawson) to obtain samples of rock for potassium argon dating tests by scientists in Australia. It is expected to find that it is part of an ancient Antarctic basement complex which may be 600 million years old, the same as the rock at Mawson. From there they clambered up the North Masson Range to "Lake Heidi," nestling among

impressive rocks at the south end of the range.

It is reported that the lovely frozen lakes are a joy to see as, for instance, Lake Lorna, shaped like an artist's palette, with a vertical walled glacier at one end, moraine massed boulders at the other end and bare mountain cliffs on each side. An occasional white Snow petrel swoops across its curiously cracked tinted surface.

WATER SUPPLY

During the winter Bennett worked quietly along in his spare time building a pipeline from where a fresh water melt pool opens up in midsummer. Most of the year a daily job for everyone is to cut snow and carry it to the snow melter, but now during midsummer those at Mawson hope to be able to pump their supply.

SPRING BRINGS WELCOME DIVERSION

The October report from Leader Erskine at Mawson begins:

"We are now welcoming back the birds and seals for their summer stay. In winter it was all very dull with only men, dogs and Emperor penguins—but now this frozen dead continent is seething with life all round the edges: slim, white Snow petrels, fat, grey skuas and big, brown Giant petrels; and flopping around on the sea-ice are innumerable Weddell seals breeding and rearing their young. These seals slither up out of the ocean through the round holes they have bitten in the ice. On all the rocky islets around Mawson thousands of Adélie penguins are going through their mating routine: the male stands high preening himself and if the female shows interest he picks up a small stone, laying it at her feet as if to say 'let's build a nest'; if she thinks it a good idea she accepts the stone and delighted he flaps his wings and sticks out his chest!"

MAWSON MEN ON PLATEAU

A report was received on November 22 that an inland Antarctic traverse party of five Australians

from Mawson Station had completed an important part of their two-month programme in the field.

Leaving Mawson on November 4, the men first established a temporary geomagnetic station at Depot A, 60 miles inland on the Antarctic Plateau at 5,000 feet above sea level. This will be manned by two men, Kerr, physicist, and Lockhart, carpenter, for one month. They will live in a small fibre-glass caravan tending electronic equipment and making weather observations. The inland geomagnetic station will make micropulsation recordings which will enable an investigation to be made of the part played by coastal effects at Mawson, Wilkes and Macquarie Island in studies of the earth's magnetic field.

The main section of the traverse party is continuing further inland with a heavily loaded tractor train and will store fuel to serve as a depot for the 1968 Amery Ice Shelf glaciological station and also along the route for future parties who are to do survey work in the Prince Charles Mountains, 250 miles south of Mawson. The present party will also carry out a very accurate survey by tellurometer over a distance of 100 miles linking inland mountain ranges with coastal ranges. This five-man party is led by Manning, surveyor, and is accompanied by Thomas, physicist, Forecast, weather observer, Jackson, radio operator, and Butler, diesel mechanic.

WILKES NEWS

The August report from Wilkes began:

"This month has seen the usual run of bad weather which has severely limited outdoor work—people are beginning to doubt that Wilkes is the 'Bananaland of the South'."

With all the bad weather and high winds, veteran Antarctic Currie spent much time outdoors, assisted by McGrath, repairing wind damage to radio aerials—a most frustrating job. The mechanics had

more than their share of frustrations too in August when the D4 bulldozer broke a final drive housing outside the garage door just as a blizzard started; Mitchell brought the Nodwell to pull it out but at the crucial moment the Nodwell broke a track. Two days later, all that was visible of D4 was the top of the exhaust pipe above a snow-drift. With the only serviceable bulldozer inside the garage, Weir and Glenny set out for Repstat to repair the small front-end loader and return with it to dig out D4. After two days of digging and getting the toy-sized machine bogged many times, finally the garage door was cleared, allowing the big bulldozer to be driven out. Another day's digging with this machine and a couple of broken ropes later, and they had cleared the buried dozer. Most members of the camp then proceeded to clear in and under the machine with shovels.

AUGUST WEATHER

Weather figures for the month: Max. temp. 32.4°F; min. minus 16.3°F; max. wind 118 m.p.h.; total wind run for month 10,840 miles; average speed 14.6 m.p.h.; max. pressure 994.5 millibars; min. 952.5.

FIELD PARTIES RETURN

Dome and S2 parties returned to base at the beginning of September after six weeks in the field, having successfully completed their projects under a handicap of four weeks of blizzards and whiteout, and a broken down vehicle. The minimum temperature experienced was 78°F. below freezing.

During September Baggott, accompanied by Currie, Kelly and Jackson completed a lengthy dog trip, calling at Cape Poinsett (85 miles ENE of Wilkes), Haupt Nunatak and scenic Vanderford Glacier (about 20 miles south of Wilkes). Just after leaving the station they were blizzed in for four days. However, they managed to travel an average of 20 miles a day but found travel on the plateau very boring and welcomed the opportunity of returning to base over the sea-ice.

Preparations were also well under way for the spring programme in which two separate parties will be participating. McGrath, Stickland, Farbuck and Weir form an optical levelling party; whilst Carter, Olog and Mitchell will carry out gravity meter and radio echo sounding work.

Wilkes' weather for September was quite mild: lowest minimum temp. minus 11.2°F., highest maximum 35.5°F.; highest wind speed 78 knots. Summer months will melt away most of the snowdrift that covers the station and provide them with door instead of hatch access to the outside world.

October ushered in spring activities with the departure of the main spring trip round most of the eternal triangle; the reoccupation of Repstat; the return of the Adélie penguins; intrepid swims in the bay.

ANTARCTIC SURGICAL OPERATION

On September 12 a successful operation for appendicitis was performed at Wilkes. The patient was Colin Whitehead, who is aged 24 and married. The first symptoms of the illness were shown on September 7. After tests by the station's doctor, a surgical operation commenced at midnight on September 9, when a mildly inflamed appendix was removed.

The surgeon was Dr. Robert Liddell, aged 25, formerly resident medical officer at the Albury Base Hospital, N.S.W. Dr. Liddell reported that his patient made very satisfactory progress towards recovery.

Liddell was ably assisted by Tarbuck, Broad and Canham, while Weir kept constant watch on diesel generators to ensure that possible power failure would not interrupt the operation. Dr. Liddell insists that the performing of the operation was an easy matter but that the hard part was being nurse and personal physician during the convalescent period.

DAVID RELIC

The University of Sydney has been given a barometer used during

NEW ZEALAND'S IDENTITY IN ANTARCTICA

by COLIN CLARK*

There is no question whatever that New Zealand continues to make a very worthwhile contribution in the Antarctic. In these days of economic recession, our citizens are more likely than ever to query the annual expenditure on the New Zealand Antarctic Research Programme. To many, it may seem a little crazy to be studying the intricate movements of the McMurdo Ice Shelf or the occurrence of inter-tidal crevice fauna at Cape Royds when at home we have so many pressing problems.

I would very much hope that such scepticism does not spread to our politicians and policy-makers.

an expedition to the South Magnetic Pole in 1907-09.

The barometer was used by Professor (later Sir) **Edgeworth David** during the expedition.

David was a member of Shackleton's expedition which was based at Cape Royds, McMurdo Sound, during 1908-09. While Shackleton and three companions attempted their historic journey towards the South Geographic Pole, David was entrusted with the leadership of a three-man party which set out to establish the position of the South Magnetic Pole.

In 1910, Professor David gave the aneroid barometer to Captain J. K. Davis, first mate on the "Nimrod."

Captain Davis, who died on May 7 this year, had expressed a wish that the barometer go to the University of Sydney.

Still in perfect working order, the barometer will be placed with other expedition exhibits in a special show case in the Edgeworth David Building.

In the Antarctic, New Zealand commands a respect that seems sadly lacking in other external spheres. We can feel considerably proud of what our country has achieved in the ten years since Scott Base was established. Our successes and methods of working are envied; our Base has an individuality and esprit de corps that contrasts strikingly with others; and the best possible image of New Zealand is gained by the many overseas visitors to Scott Base. Our young men come home aware and proud, for the first time, of their identity as Kiwis.

It is an unfortunate fact that many people believe the New Zealand Antarctic Programme leans heavily for its support on the United States Navy. This is erroneous. While it is quite true that our personnel are flown south on U.S. aircraft and are supported in the field by U.S. ships and helicopters, it should always be remembered that these services are provided in return for payment of all dues incurred by U.S. aircraft at Christchurch International Airport (a very considerable sum). This cost is borne by the New Zealand Government. In addition, of course, the Royal New Zealand Air Force and the Royal New Zealand Navy give significant support to the United States' Programme, with flights by RNZAF Hercules aircraft and bulk fuel carrying by HMNZS "Endeavour."

As it happens, relations between the New Zealanders and Americans in Antarctica have always been wonderfully cordial, based on mutual respect and independence as well as genuine friendship. The point is worth making to all New Zealanders, however, that Scott Base has a very distinct identity. As a consequence, it has much to contribute to our young men who become proud of their nationality by working there. It is that pride in country and the teamwork it inspires that make our Antarctic programme so outstandingly successful.

* Leader, Scott Base, 1967.

JAPANESE BEGIN FIELD JOURNEYS IN MID-AUGUST

Dr. Torii and his men who have been wintering at Syowa have begun early to probe out from their base. As we go to press these keen men were making their fourth foray since the return of the sun.

At Syowa Station, after the return of daylight the activities of the JARE VII wintering team were intensified. Research trips near the station began on July 29.

Between August 17 and September 2, a party led by Dr. T. Torii made a survey along the Prins Olav Coast from Syowa to Molodezhnaya Station. The party surveyed the exposed rock area along the coast and glacial features. They also sampled ice and snow, and collected microbiological specimens.

Dr. T. Torii and nine men visited the Soviet Molodezhnaya Station, from August 22 to 25, and were given a hearty welcome. An accident occurred on their way back. On August 27, one of the snowcars dropped into a crack of fast ice near Shinnan Rock (some 250 kilometers north-east of Syowa Station). Dr. Torii, who was the driver, and the other crew members had a narrow escape from the sinking snowcar. The vehicle was lost.

The weather in August was not favourable for aurora observations, and the all-sky camera was operated on only eight days. The average air temperature was -18.8°C ., the average wind speed 6.3 m/sec., the mean pressure 985.4 mb, and the average cloud cover 8.2. The minimum temperature of -38.6°C . was recorded on the 2nd.

From September 16 to 27 a trip into the inland was made to set up a fuel cache. The destination depot was laid at $70^{\circ}01.1'\text{S}$., $43^{\circ}06.5'\text{E}$., at an altitude of about 1,800 m. Observations at the station were continued on a routine basis during September.

Between October 6 and 13 intensive field surveys were conducted in exposed rock areas to the south of Syowa, at Langhovde, Skarvsnes,

Skallen and other areas. The subjects studied were geomorphology, geology, glaciology, geochemistry, and biology.

It is planned to make an over-snow traverse into the continent between November 1, 1967, and January 15, 1968. Up to November 4, the party was still at the station because of bad weather. The party will be led by Dr. T. Torii and consists of nine men (four scientists and five support personnel).

The party will make observations in glaciology, gravity, geomagnetism, meteorology, geochemistry, and physiology. Seismic shootings to determine the thickness of ice will be made at intervals of 50 to 70 km. They will proceed to the south along the meridian of 43°E . and if circumstances are favourable they will visit the American Plateau Station ($75^{\circ}15'\text{S}$., $40^{\circ}30'\text{E}$.). The final station will be at about 80°S ., $40^{\circ}30'\text{E}$. Five oversnow vehicles (three large KD-60 and two KC-20 type) and 17 sledges including three cabooses will be used. In addition, small vehicles will be used to the area about 75°S .

(Later.) Dr. Torii's party departed from Syowa on November 4. They plan to construct six depots with a total of eight tons of fuel, which will be required for the long journey to the South Pole, planned by JARE IX wintering team led by Mr. Murayama.

The whole journey will be about 1,500 kilometres. Return to Syowa is expected on January 15, 1968.

PLANS FOR JARE-9

The preparation of JARE-9 to be led by Mr. M. Murayama is currently in full swing. The expedition's ship "Fuji" will leave Tokyo

BRITAIN AND AMERICA PREPARE AN AIR-BORNE LABORATORY

In Christchurch on November 17, American and British scientists said they were about to convert a United States Navy Super Constellation into an airborne laboratory from which they will make radio echo-sounding of ice thickness in the Antarctic and an infra-red survey of the continent's thermal activity.

ECHO SOUNDING

The ice-thickness measurements will be made by four men from the Scott Polar Research Institute at Cambridge, England. Dr. Gordon

on the 25th and will call at Fremantle, W.A., during the voyage from Tokyo to the Antarctic. The ship will cover the same route as in the previous year. Between Fremantle and Cape Town an American meteorologist will be on board the "Fuji" as an official observer, making kytoon observations in the Antarctic Ocean from the ship. He is Mr. M. P. Sponholz, and he wintered at Plateau Station in 1966. His affiliation is the U.S. Weather Bureau.

The wintering party will number 29, including five mechanics, three meteorologists and a newspaper man. The summer party will total 15 in addition to two foreign observers.

The ice-breaker "Fuji" starts her third Antarctic voyage on November 25. On November 10 a send-off party was held in Tokyo. Over 200 attended, including Dr. T. Nagata, Dr. E. Nishibori, Dr. A. Muto, Dr. T. Yoshikawa and Mrs. T. Torii. Mr. Murayama and his 27 wintering party were introduced to those present.

MEETINGS

As previously announced, Japan will sponsor a meeting of Logistics Specialists under the Antarctic Treaty Powers on June 3-8, 1968, in Tokyo. Also the 10th SCAR Assembly will be held in Tokyo on June 10-15, 1968.

Robin, the institute's director, said that if the technique of using low-frequency radio echo-sounders were successful, it could ultimately be applied to the whole of Antarctica.

While with the older method of seismic shootings it sometimes took a day to fire one shot, necessitating boring a hole from 50 ft. to 100 ft. deep, from an aircraft one could obtain a continuous profile of the ice thickness and the rock surface under it.

Dr. C. M. Swithinbank said the aerial radio echo-sounding technique had been used successfully in Greenland, and last year it worked satisfactorily from a light aircraft from the British Antarctic Survey's base at Adelaide Island, on the Antarctic Peninsula.

This season it was intended to test the continuous profiling, using a long-range aircraft flying out of McMurdo Station.

So far the technique, developed by Dr. S. Evans, who is also taking part in the study, has been successful on ice up to almost two miles thick.

U.S.A.-U.K. CO-OPERATION

This echo-sounding project is a co-operative venture among the Scott Polar Institute, the United States Antarctic Research Programme, and the British Antarctic Survey. Closely co-ordinated with it is an infra-red survey to map the heat distribution of different surfaces in the Antarctic. This is to be undertaken by Dr. G. J. Zissis and Mr. D. C. Parker, of the University of Michigan.

Mr. Parker said the survey would define the magnitude of Antarctica's thermal activity. He was particularly interested in the thermal area around Mt. Melbourne, which was discovered last year by a New Zealand expedition.

VOLUME ENDS

This issue of "Antarctic" is the last of volume 4. An index will be prepared, and binding arrangements notified as soon as possible.

HALLEY BAY DOCTOR INJURED

MERCY FLIGHT

A British doctor, seriously injured on December 2 at Halley Bay, on the Caird Coast of the Weddell Sea, was evacuated on December 5 in a U.S. Navy Hercules from the British base to McMurdo. He was then flown out to Christchurch. By the time it landed at McMurdo the crew of the Hercules had flown almost continuously for 3,500 miles. The Commander of the aircraft was Cdr. A. F. Schneider, Commanding Officer of VX6 Squadron.

In a message relayed to Christchurch through Washington, Sir Vivian Fuchs, Director of the British Antarctic Survey, reported this Dr. John Brotherhood (28) had suffered a broken jaw, a broken nose and three fractured vertebrae in a fall. First word of the accident was received at 6.14 a.m. on the 5th. Sir Vivian said that the base could not be reached by a British supply ship until early January.

HERCULES SETS OUT

Two Hercules of VX6 Squadron flew the 820 miles from McMurdo to the Pole Station, the first leaving at 12.56 and the second at 2.34. One flew on to Halley Bay, arriving there at 7.27 p.m. The second flew part of the way to act as a communications relay. No detailed information on the weather at Halley Bay was available at the Christchurch headquarters, but satellite photographs showed favourable weather with some cloud.

After taking Dr. Brotherhood aboard the aircraft took off at 9.5 p.m. for McMurdo.

After examination at McMurdo it was decided to fly the injured man to Christchurch.

The long journey from Halley Bay right across the Antarctic continent via the Pole to McMurdo Sound, and then on to Christchurch, New Zealand, is said to be

the longest rescue flight in Antarctic history: 5,600 miles in about 20 hours.

Dr. Brotherhood, safe in Christchurch Hospital, told an interviewer he was "speechless" because of the stupendous efforts made to save his life. He told how he had fallen over a cliff in a white-out while conducting an experiment in human physiology and had lain there 24 hours before being discovered.

STOP PRESS

VOLCANIC ERUPTION DESTROYS TWO BASES

As we go to press comes the news of a serious volcanic eruption at Deception Island (62° 57' S., 60° 33' W.) off the tip of the Antarctic Peninsula south of South America.

The British, Chilean and Argentine bases on the island were all evacuated, the British and Chilean personnel being rescued by the helicopter from a Chilean vessel, "Piloto Pardo," to which they were flown. The vessel had just effected the annual relief.

Apparently no lives were lost. The British and Chilean bases were almost completely destroyed but the Argentine base was only slightly damaged.

A press report from Punta Arenas states that a pall of black smoke and ash hung over the Antarctic island of Deception on December 6 as the volcanic eruption which badly damaged two scientific bases still spewed out fire and lava.

There had been no volcanic activity on the island, in an area disputed by Argentina, Britain and Chile, for many years.

The three nations have been working together on Deception, mainly on weather research programmes, under a 1959 treaty shelving political issues.

We hope to publish fuller details in our March issue.

NEW TEAM FOR SANAE

SOUTH AFRICANS GET READY

The Ninth South African Antarctic Research Expedition comprises:

Leader, D. J. Joubert; Meteorologists, F. Clements, C. P. de Beer, H. J. Aucamp; Geologists, A. P. H. Aucamp, B. R. Watters; Physiologist, D. P. J. Smith; Cosmic Rays, G. J. Scholtz; Geomagnetist, J. Smith; Surveyor, D. B. Bosman; Ionosphere, M. H. Williams; Medical Doctor, H. Rode; Senior Mechanic, W. B. Meyer; Mechanic, C. A. Spencer; Radio Technician, J. W. Grobelaar; Radio Operator, W. J. van Zyl.

With only one exception, all previous South African Antarctic expeditions included among their members at least one Antarctic veteran, and two members of the new team have had previous experience of the Antarctic: D. J. Joubert as member of the team during 1965/66 and J. Smith during 1966/67. Both of them were in charge of the cosmic ray programme.

Only two members of the team are married and they are also the only members older than 27 years. They are Meyer and van Zyl.

WELL PREPARED

The expedition will assemble in Pretoria toward the end of November where they will receive training in the art of cooking, fire prevention and fire fighting as well as a physical fitness course. These courses will be conducted by the Department of Agricultural Technical Services, the Pretoria Municipality and the South African Defence Force.

A new course this year, to be conducted by the Public Service Commission, will give training in supervision and planning as well as instruction in human behaviour under adverse conditions.

No new research projects are to be undertaken by the new team, although some of the existing pro-

grammes are to be extended, e.g., the cosmic ray programme will operate an additional Riometer.

The physiologist will do an independent study on recreational requirements at the Base with a view to improved facilities should a new base be built.

For the geophysicists a very interesting year is expected as the sun will reach the maximum of its present cycle during 1968/69. Apart from the interesting results in the fields of cosmic rays, ionospheric physics and geomagnetism, there should be some brilliant auroral displays.

AT SANAE BASE

All the scientific programmes at the Base are excellently maintained and the results are interesting, owing to the increase in solar activity. A major solar flare recently provided a spectacular auroral display in addition to valuable results on sun-earth relationships.

Unfortunately, the weather and mechanical problems combined to delay the departure of the second field party. Once on their way, though, their progress was excellent and if the weather remains favourable, it is expected that their main objectives will still be reached.

Morale is very good at the Base although almost every man has to take care of additional work to keep all the programmes running. Towards the end of the year the work will increase markedly as the preparations for the relief of the Base by Sanae 9 have to be made. These include the backbreaking task of raising the diesoline supply to the surface. During the course of the year the 800-1,000 25-gallon drums of diesoline have been covered by about four feet of accumulated snow. Although hard work, this task is done very willingly as its completion means that the year is past and that the "RSA" will soon be anchored in one of the Buktas.

ARGENTINE ANTARCTIC ACTIVITIES FOR 1967-68 SUMMER

The following organisations will carry out programmes in the Antarctic during the 1967-8 summer: the Argentine Antarctic Institute, the Naval Hydrographic Service and the Argentine Army and Air Force. The major operations include the relief and reprovisioning of the bases, detachments and stations maintained by Argentina in the Antarctic, and other scientific and technical activities which do not conflict with the provisions of the Antarctic Treaty.

SCIENTIFIC ACTIVITIES

The Naval Hydrographic Service is giving priority to the reconnaissance of the Weddell Sea in order to determine what influence it has on the formation of ocean currents. To this end the Service will work jointly with the U.S. National Science Foundation which will charter the U.S.S. "Glacier," while the Argentine Navy Group will assist with the ice-breaker "General San Martin" from February 1. Argentine units taking part in the programme will be the "General San Martin," the transport "Bahia Aguirre," the polar vessel "Martin Karlsen" (chartered for the season) and an aeronaval group comprising two helicopters and two Beaver aircraft.

SHIP MOVEMENTS

The "General San Martin" was scheduled to leave Buenos Aires on approximately November 3, to transport relief personnel, to carry out the reprovisioning, repair and maintenance of Matienzo, Belgrano and Sobral bases, to inspect the detachments and naval emergency stations in the area, and to carry out necessary beacon installation work. All these tasks should be completed by February 1, when the oceanographic programme is timed to begin.

The transport "Bahia Aguirre" was due to leave Buenos Aires on November 17 with the personnel required to effect the relief, reprovisioning and maintenance of the Navy's Decepcion and Orcadas Stations, the Petrel Aeronaval Station, Esperanza Base, and the Scientific station Almirante Brown. The Navy emergency hut Groussac will be reconditioned so that marine biological investigations can be carried out during the summer. Oceanographic, meteorological and beacon-repair work will also be undertaken. The vessel will be utilised also for the inspection of naval detachments, bases and other establishments, and to transport national dignitaries visiting this sector of the Antarctic.

The Air Reconnaissance Group will carry out geological reconnaissance flights in the vicinity of the ships and stations in support of the logistic and scientific programmes, and will transport men and cargo as required between ships and stations. The Group will also carry out a reconnaissance of the area in which lies the Cessna 185 Army aircraft damaged in the previous season.

The "Martin Karlsen" will restock the Matienzo, Belgrano and Sobral bases, leaving Buenos Aires about November 6. The ship's scientific programme comprises Gentoo penguin studies and the collection of histological and ichthyological specimens at Puerto Paradaiso.

ARGENTINE ANTARCTIC INSTITUTE

The scientific and technical programme drawn up for the 1966-67 summer period was carried out in full.

ALMIRANTE BROWN

Study and collection of biological material and ichthyological studies

at Puerto Paradaiso.

Installation of a new ramp for the sail and motor launch "Kolen-ten," supplied this year, and of a cylindrical metal fuel-storage tank of 20,000 litres capacity.

A new building was constructed for the emergency generation of electricity. This building will also be used as accommodation for three summer-party construction and repair men. The emergency hut to accommodate summer personnel in future years was equipped.

Added equipment in the meteorological station included a SIAP anemometer and a KIPP and ZOREN solarigraph. All the equipment was adjusted and calibrated.

GENERAL BELGRANO

Unloading was completed and the equipment inspected. Further preliminary work was carried out for the construction of the auroral observation tower begun last year. Inside the tower are a JET-HEET heater of 19,000 calories, the platform for visual observations with its dome nine cm. in diameter, the support for the exterior all-sky camera, its mechanism for elevation and recording and the platform supporting the photometer.

DECEPTION ISLAND

Continuation of topographic and bathymetric work and the collection of sedimentological specimens from the lakes on the island. Geochemical studies, including the collection of gas samples (1) from a fissure in the hill at 86°C., (2) from the fumaroles; also the examination of sediments affected by the sulphurous emanations from the fumaroles. Palaeomagnetic studies, topographic work: comparison of the surface levels of the water of Lake Irizar and the inland lake during high and low tides.

A mobile unit on the ice-breaker "General San Martin" made observations of the sea-ice throughout the whole voyage.

ECHOES OF 1914-17

FOUR "ENDURANCE" MEN STILL ALIVE

There are four known survivors of the 28 men on "Endurance," which carried Shackleton's abortive Trans-Antarctic expedition to the Weddell Sea in December, 1914, but was trapped by the ice on January 20, 1915, crushed, and sank on November 21, 1915—ten months later. All the survivors are about the 80 mark.

They are:

W. L. Bakewell, seaman
Charles Green, cook
Cdr L. Greenstreet, Chief Officer
Walter E. How, sailmaker.

Bakewell lives in Michigan, U.S.A. The other three live in England.

Mrs. Mooy (née Toni Hurley) recently received a letter from How's niece, now living in Queensland, and through her obtained the above information, which she has kindly forwarded to "Antarctic."

FAMOUS BOAT ON DISPLAY

Shackleton's boat "James Caird," in which he and five companions made the famous 800-mile voyage from Elephant Island to South Georgia in April, 1916, is to be restored at the National Maritime Museum, Greenwich. One of three ship's boats on the crushed "Endurance," "James Caird" was partially decked in by carpenter James McNeish, later a Wellington resident and buried in Karori Cemetery. He was one of those who made the voyage. The navigator was Frank Worsley, a New Zealander, born in Akaroa.

FAR-FLYING PETREL

A Giant Petrel found dead in August near Kaitaia, North Auckland, had been ringed at l'Ile de la Possession in the Crozet group south of South Africa, on December 5, 1966, for the French National Museum of Natural History. The Museum has informed the finder, Mr. A. Allen, that the bird was hatched on October 27 last year.

CHILEAN ANTARCTIC BASES

ANNUAL CHANGE-OVER

The task force which will relieve the men who have wintered at Arturo Prat, Bernardo O'Higgins and Pedro Aguirre Cerda bases is under the command of Capitan de Navio Boris K. O'Neill, who was the first officer of the Chilean armed forces to set foot on the South Polar ice-cap. Twenty years ago he was the Naval Officer to whom was entrusted the responsibility of asserting Chilean sovereignty at the spot which is now the site of Arturo Prat Station.

The relief flotilla comprises the transport "Piloto Pardo" and the oceanographical research vessel "Yelcho." The ships will be engaged in the Antarctic operation for three months.

In addition to the 37 members of the Army, Navy and Air Force who will have the Chilean bases in their care, a group of scientists from the Chilean Antarctic Institute is on board.

SCIENTIFIC PROJECTS

Captain O'Neill told pressmen that biologists would be carrying out a full scale penguin census. The penguin population, he said, has been diminishing despite the international agreement for the conservation of Antarctic fauna. Another group of scientists on the "Yelcho" will be taking water samples, subsequent examination of which will provide information on the life contained in them. The second seismograph in the Antarctic will be set up, said the Captain, at O'Higgins base. "Piloto Pardo" will transport all the equipment required for this purpose.

A geological team of three men will live for 75 days on an island, completely isolated, to study the rock formation of this area, collect samples and make some soundings.

REGIONAL MET CENTRE

Starting from this year, Pedro Aguirre Cerda Station will be the regional centre for the collection

of meteorological data. The aim will be to gather information from the other bases, Chilean and foreign, including those operated by Australia and New Zealand. The data will be forwarded to Washington for processing.

ICE-BREAKER WANTED

Captain O'Neill said that the acquisition of an ice-breaker for Chile, primarily for Antarctic work, was becoming every day more essential, more especially to enable research to be carried out further to the south, and also in case a difficult winter demanded a relief of a kind which "Piloto Pardo" could not carry out, since this ship was not built for navigation in Antarctic waters. He estimated that a suitable ship of the ice-breaker type would cost more than ten million dollars, but that such a vessel would provide for all contingencies and requirements.

RELIEF OF BASES

At the Navy Base next winter there will be nine men, at the Air Force Base 16 (augmented because of the importance of the work now projected), and at the Army Base 12. All these were to travel by air from the capital to Punta Arenas to join the ship on November 15, the date on which it was due to reach that point. Travelling with the relief parties would be the 15 scientists who are to carry out work in the Antarctic.

The ships were due to leave on November 20 for Bahia Soberania where they will anchor four days later. The following day they will disembark the Army relief men at Bernardo O'Higgins base. On the 26th "Piloto Pardo" should anchor at the Coleta Peninsula to relieve the Air Force men at Pedro Aguirre Cerda.

The return of the teams at the three bases where they will have lived for a year in the Antarctic is fixed for December 5, arriving at Punta Arenas on the 9th or 10th.



Photos: T. Van Autenboer

AT BASE ROI BAUDOIN
Electrical Winch above main entrance

ANTARCTIC STATIONS

11

ROI BAUDOIN

In January, 1958, the old weather-beaten flag of the "Belgica" (1897-1899) flew again in Antarctica marking the construction of Base Roi Baudouin. The building of the base by *Expédition Antarctique Belge 1958* led by G. de Gerlache, son of the master of the "Belgica," started the renewal of Belgian scientific interests in Antarctica.

The expedition fulfilled the programme of the I.G.Y. The base was maintained as a fully operational station during 1959 (leader F. Bastin) and 1960 (leader G. Derron). In addition, geological, geodetic and glaciological reconnaissance work was carried out by the three expeditions along the coast

and towards the interior of the continent. In 1958 and 1960 aircraft were maintained at the base and led to the photography and cartography of two mountain ranges, the Belgicafjella and the Dronning Fabiolafjella. In the beginning of 1961 after a successful summer programme (which included a deep-drilling project on the ice-shelf and oceanographic research) the base was closed down.

In February, 1964, a Belgian-Dutch expedition† (leader L. Cabes) sponsored by a committee with G. de Gerlache as chairman, reopened the station and built completely new headquarters some 300 m. to the north of the old site.

The rawin tower and the survival building dating from 1960 were taken back to use. The 1958 buildings were at that time covered by some 8 metres of snow and showed

† The organisation of the expeditions is entirely done in Belgium. The Dutch participate for a third of the expedition.

strong deformation. The station was occupied until the beginning of 1967 when the 1966 Belgian-Dutch Expedition (leader T. Van Autenboer) closed the base.

In addition to the main geophysical programme and the 1966 geological and glaciological reconnaissance traverses, the Belgian-Dutch Expeditions from 1964 onwards carried out extensive summer programmes.

This was mainly based upon the use of two aircraft (Otter and Cessna) and an Alouette helicopter, and included geology, glaciology and photogrammetry. Oceanographic work was done on board the "Magga Dan" chartered in Denmark.

GEOGRAPHIC SETTING

Base Roi Baudouin is situated near the land margin on a small ice-shelf in 70°25'S. and 24°18'E.

The closest bay allowing access to the sea-ice for discharging and loading operations is some 12 km. to the north. To the south the inland-ice-ice-shelf junction is some two miles distant. Snow accumulation at Base Roi Baudouin has been measured as 40 cm. of water equivalent per year. Of course the numerous hindrances related to the existence of the base (buildings, vehicles, antennas, depots, etc.) increase this figure manifold. Some spreading of the ice has been measured but movement is less important than on the free flowing ice-shelf to the north-west.

The mean seasonal temperatures recorded in 1958 were:

Spring: -15°, 2 C.

Autumn: -12°, 9 C.

Summer: -5°, 0 C.

Winter: -22°, 0 C.

The minimum temperature recorded in 1958 has been -48°C. while the maximum reached +0°, 8 C.

Drifting snow has been recorded during more than half of the year. Wind velocities of 30 knots are very frequent, wind direction is remarkably stable and from a south-south-east direction.*

THE BASE

The situation of the base on an ice-shelf implies a subterranean existence with all its inconveniences, and a limited life expectancy of the buried constructions. The general lay-out of both the 1958 and 1964 bases is very similar.

THE MAIN BUILDINGS

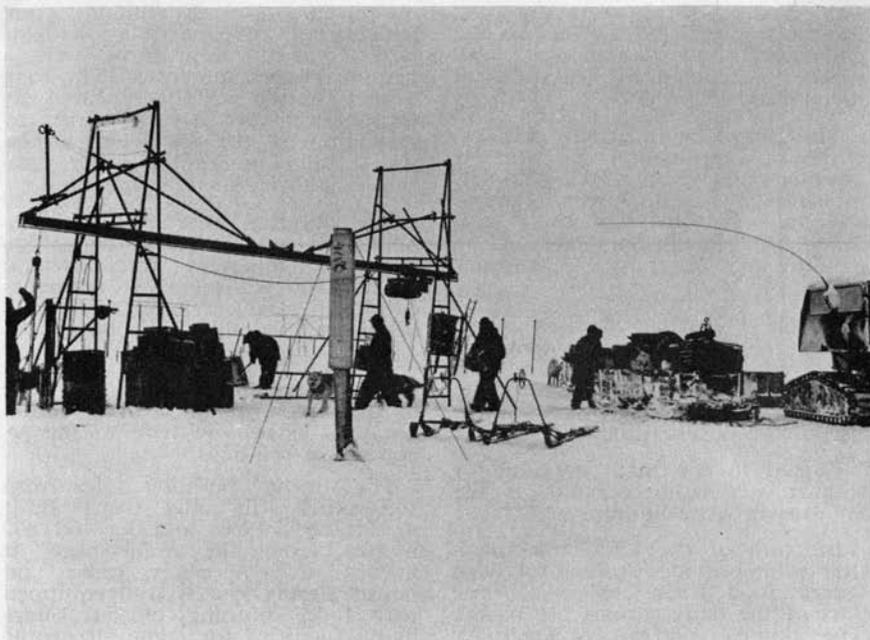
On the surface an electrical winch mounted upon a large tubular scaffold marks the main entrance. The latter is formed by a vertical shaft which allows access to the corridor linking the main buildings (quarters, science and power).

The corridor itself is used as a storage place. In the old base it consisted of two rows of boxes covered with chickenwire and canvas. A considerable improvement in the new base was the construction of a corridor with prefabricated panels similar to the ones used for the main buildings.

The 1958 buildings were furnished by the American firm Clements and characterised by the very strong trusses for both roof and floor. The weight of the floor is evenly distributed over trusses and two strong beams resting on two lateral rows of heavy snow-sills. This construction leaves a wide open space under the buildings, providing additional insulation. The essential difference with the later buildings which were manufactured in Belgium was the use of wooden lamellated rafters for the roof and insulated caissons for the floor. The latter were deposited directly on the snow and caused trouble as the floor proved insufficiently rigid to prevent sagging over the hollows caused by heat-conduction from the base. The heating of the different buildings is furnished by two powerful kerosene burners with hot air blowers. Linked to the heating system are the air-extracting units.

In January, 1967, the old base was still accessible. The roof had come down considerably and the girders were deformed and locally sheared. Some of the interior panels had been pushed right through the floor. The best preserved parts of the old base were

* de Maere d'Aertrycke, X., *Météorologie*, Fasc. 3, *Traitements Statistiques*. Résultats Scientifiques Expédition Antarctique Belge 1957-58. Bruxelles.



RADAR DOME AFTER TWO WINTERS
Balloon-launching hut to the left

the narrow corridors where the natural tunnelling possibilities of compacted firn are used. The glaciological pit is slowly but constantly closing.

"QUARTERS" (300m²) provides individual cubicles for the members, a spacious living room, a kitchen and a washroom furnished with running hot and cold water.

The radio station with a 800 kw. transmitter was also housed in this part of the base. In addition to the regular schedules both with the other Antarctic stations and with Belgium, expedition members have a free weekly telephone call with their families.

"POWER" (72m²) houses three 20 KVA diesel generators to furnish the necessary electricity. One generator is in constant use. The operation of the electric winch or the welding apparatus necessitates the use of an additional generator. The heat of the exhaust gases of the engines is used for the melting

of the snow. The water is then put under pressure and distributed by electrically warmed pipes. Drift snow is collected for the water supply.

At the old base the digging of a 16 m. deep glaciological pit furnished a welcome solution to the water problem. At times production exceeded use and showers were made compulsory!

The most conspicuous feature of "SCIENCE" (100m²) is the ionosphere sounder (Barker & Williamson C4). The same department also houses the two riometers (20 and 30Mc), the quartz-clock, the IBM clock programmed for ionosphere, geomagnetism and aurora. The dark room is in constant use by the geomagnetician and the ionosphere technician.

The infirmary is large and well stocked, with a complete set of surgical instruments.

Most of the space in the meteorological office is taken by the

TMO and control recorders and the plotting boards used during the daily radiosonde launchings. Wall space is occupied by the different meters and recorders.

The Dynes anemograph, coupled, with a compressor which starts automatically when drift blocks the pipes, is housed in "Power." Part of the meteorological office is also taken by the instruments of an experimental programme for atmospheric electricity.

"Science" further houses small offices for the geomagnetician, the surveyors, the geologists and the expedition leader. An electrically heated fibreglass dome is used for the aurora observation.

Linked to the main corridor by a narrow twisting corridor is the small hydrogen building.

In front of the kitchen a spacious cellar provides storage for deep freeze food upon which a large part of the daily rations are based. The pumps for the radioactivity measurements are also placed in the corridor. In the old base a 16m. deep glaciological pit communicates with the corridor. At a depth of some 5m. a spacious glaciological laboratory was dug.

SECONDARY BUILDINGS

Directly connected with the daily routine of the base are the six metres high rawin tower with the radio theodolite, the hut for the filling and launching of the meteorological balloons, and the ozone hut housing the Dobson spectrometer and ozone surface recorder. These buildings are placed upon tubular scaffolds which can be raised quite easily.

The geomagnetic instruments are housed in two electrically heated huts located 150 m. from the main buildings. One containing the recorders (La Cour and Askania) is equipped as a dark room. The other hut is used for the absolute

measurements of the different components of the magnetic field as well as of its total force, with a proton magnetometer. A 75 m. long tunnel is used for the repeated determination of the azimuth as spreading of the ice seems to be the cause of a regular minor rotation of the ice-shelf at the base.*

The different antennas (1 rhombic, 1 Reuss), 1 Ve, 1 ionosphere and two riometers, antennas and masts for different instruments (atmospheric electricity, solar radiation, etc.) complete the base.

Two small meters for the atmospheric electricity programme are located at a distance of 4 and 8 km. and linked by wire to the recorders at the base.

The survival building dates from 1960 and is still going strong. Built in January, 1960, and located 400 metres from the main base, it houses an emergency radio and power supply and is well equipped with food, clothing, etc. It offers living facilities for some 20 people and comes into full life during the summer programme.

Up to 1965 an appreciable amount of stores were put into outside depots to be dug out regularly. In 1966 two experimental 60 m. long corridors were taken into use instead of the "open" depots. Dug by the bulldozer, they were covered by cheap, arched corrugated iron plates. All through the year they proved well worth the investment.

Scaffolds are also used to store some equipment out of the reach of the drift snow. A 30m² helicopter platform is the newest addition to the base.

Vehicles and sledges are left outside and regularly dug out. Vehicles include: one light bulldozer, three Sno-cats, two muskegs and three motor toboggans.

The dogs which are extensively used for the geological and glaciological work usually roam around in complete freedom.

T. Van AUTENBOER.†

* H. Declair: personal communication.

† In charge of geology and gravity of the 1959 and 1960 Expéditions Antarctiques Belges. Leader geological summer party 1964-1965 Expédition Antarctique Belgo-Néerlandaise. Leader Expédition Antarctique Belgo-Néerlandaise 1966.

IN THE SUB-ANTARCTIC ISLANDS

KERGUELEN

(France)

Activity on 'les Iles Kerguelen' over the past months has centred on preparations for the rocket-firing programme, although bad weather, with snow and frosts, put a stop to most outside work during July and considerably interfered with it in August and the first half of September.

Now, however, preparations for the rocket programme are approaching completion. In the assembly section lining of the walls has been finished, central heating and electricity installed, ceiling and interior fittings completed. On the firing range itself the massive platform has been poured and the rails and conduits from assembly to firing position have been installed. The parking area has been levelled. The track to the firing platform, damaged by the repeated truck traffic, has been reinforced and in some places re-routed, involving the spreading of 1,000 cubic feet of rubble. Previously 13,000 cubic feet of rubble had been used to replace the surface soil which had to be removed because the area proved much more swampy than had been anticipated.

The frame of the new powerhouse is up, and the generators installed (still in their cases) awaiting the final foundation laying. A very short access track has been formed from the centre of Port aux Francais to the generator house.

A site has been prepared for the erection of a radio-transmission building on Gabriel Hill next season.

3,200 m. of trenches have been dug to the assembly area to provide the station with electricity and telephone; the cables are in place.

In all this heavy manual work the whole team has participated, on a roster system. Altogether, as the lively official report has it, "a particularly laborious wintering!"

Ballast for the railway line leading from the assembly area to the firing platform has been laid. The platform itself and the unloading area have been levelled and in part formed.

CROZET

(France)

Shaken by violent tempests, Port Alfred was in June still living its everyday life, while the team carried out the tasks necessary to ensure the functioning of the station and the maintenance of material and buildings, as well as the cables of the 'flying-fox.' Of all the French Antarctic possessions, l'Île Crozet seems to have "benefitted" most from the unusually heavy snowfalls, especially during September. At the base, snow drifts of over three metres have been noted.

During August, during a deep depression, the beach at Port Alfred was swept by waves which rose above the lower cable-railway station and seem to have reached the height of the crane shelter; some planks rested against it disappeared. But the landing pontoon resisted the shock of the waves very well.

Trips have been made in the direction of American Bay, during which the shelter set up there has been repainted.

MACQUARIE ISLAND

(Australia)

The main occupations for August were getting the gnat*, plus fuel and stores, to the plateau for moving to Bauer Bay for the biologists' summer sojourn amidst the Royal penguins. "Nella Dan" could not get into Bauer Bay during either the relief trip in December or the March visit, so all provisions had to be sent from the main base. Many hours were spent in back-breaking toil hoisting about 50 gallons of petrol, 200 of kerosene, half

* Three-wheeled motor vehicle.

a ton of miscellaneous stores, plus the vehicle up the side of Gadget Gully where a track gives access to the top of the cliff.

Painting of buildings, inside and out, has gone ahead thanks to the weather, as fortunately winds have been less boisterous than usual. Putting paint on to buildings in anything over a 25 knot wind is an art yet to be mastered.

SEPTEMBER DAYS

Spring heralded a fresh burst of activity on the island (not that winter was an inactive period).

Merilees, Ormay and Smith left to take up more or less permanent residence at Bauer to keep an eye on the Royal penguins which are now returning in droves. A lightning circumnavigation of the island's shore to check on Gentoo numbers gave a total of over 12,000.

The weather was unusually kind for those who undertook trips down the island: Champness and Walker in an attempt to improve radio communications with better aerials and servicing of the equipment. Svensson and Chapman were lucky enough to sight the first Weka chicks south of Green Gorge.

We are glad to note that all the stores and fuel were now over at Bauer. Even the Gnat behaved itself.

The Met. men have been having singular success with their high altitude sounding balloons, the highest altitude reached being 119,520 feet on September 19.

Someone counted over 2,800 Elephant seal cows in the isthmus area, most of them with pups. The sound of fights, roars and squeals can be heard even above a forty-knot wind.

October began with Ackerly, Evans and Ryder poised at Green Gorge for an assault on the southern half of the island. The weather was foul and the island covered in a thick blanket of snow when word from Bauer Bay necessitated a visit by the doctor to have a look at Smith's finger. Graeme had been

the victim of an attack by a Royal penguin! After much wandering around the plateau trying to find track markers, the doctor finally made the base camp. The casualty was examined the following day at Bauer, and all is well.

In the meantime, Ormay and Gully made a dash for Caroline Cove from Bauer for some albatross blood samples. The samples had to be back in the freezer within 24 hours of being taken. Despite the weather this was achieved.

The Met. Section's contribution to American polar flights started again with the addition of the second sonde flight.

MACQUARIE ISLAND RELIEF

"Nella Dan" will depart from Melbourne on December 12, 1967, carrying the Macquarie Island relief expedition, Macquarie Island summer party, and some supernumeraries. It is proposed to carry out resupply landings at the outstations at Bauer Bay, Hurd Point, Caroline Cove, Lusitania Bay and Green Gorge as well as completing the resupply of the main station at Buckles Bay. "Nella Dan" is due back in Melbourne about December 30, 1967.

"Nella Dan" will again visit Macquarie Island in March to pick up the summer party left there in December. The ship is expected to depart from Hobart on March 20, 1968, and return to Melbourne about March 30, 1968.

The Officer-in-Charge at Macquarie Island will be **David James Hasick**, a science graduate of the University of London, who has already spent one year at Macquarie. Formerly a teacher at North Sydney Boys' High School, Mr. Hasick was selected as Physicist for the 1965 expedition. Since returning from the Antarctic he has been working on research in the field of Upper Atmosphere Physics with the Antarctic Division in Melbourne.

CAMPBELL ISLAND (New Zealand)

The "Holmburn," with the 1967-68 personnel for the met. station on Campbell Island as recorded in our September issue, left Wellington on October 21 and arrived at the island on the 25th. She was back in Wellington with the men who had been relieved and two "summer only" men on October 30.

Reg. Blezard reports:

October, M.V. "Holmburn," and a mountain of stores make for the climax that is Annual Servicing, once more, on Campbell. The splendid organisation by Robin Foubister and his 1966-67 party in conjunction with that of the Administration in Wellington ensured a smooth changeover and a grand introduction for the new party.

An unusual item on the outgoing manifest was a crate containing a pair of Southern Sea Elephants. Collected by Mr. Rex Pigalles, and members from both parties, the *Miroungae leonina* will be a valuable addition to the sea-water aquaria at Tauranga.

NEW PARTY

This year's party, though one of the youngest for some time, has seven members with previous expedition experience; eight globe-trotters; and "mini" League of Nations. Within the first month the blokes have settled down well to their various jobs and new environment, helped greatly by the carry-over staff. Vince Sussmilch, the new Met. chief, reports:

"In spite of the ten days of snow, experienced so far during November, weather conditions have been rather mild; this is reflected in a considerable increase in the termination heights for the 0000Z and 1200Z upper atmosphere soundings. To date, the termination averages are 86,000 feet and 85,000 feet respectively, with a maximum bursting altitude of 107,000 feet. Averages of this standard have not been obtained at this station since 1964."

Senior Ionosphere man Dave

Bustin has increased the efficiency of his receiving equipment; while Electronic Technician Gerry Therkleson has installed new satellite gear, to determine the height of ionospheric irregularities which cause scintillation of signals.

NAVIGATION AIDS

Navigation in Perseverance Harbour is complicated by adverse weather conditions such as strong westerly winds and poor visibility, due to low cloud. Terror Shoal and the shallows off De La Vire Point are within a thousand yards of the mariner's course change, from west-nor'west to west, when making his anchorage approach.

The need for assisting ships negotiating these waters has long been discussed and is now being actioned. Captain H. Boyack, nautical adviser to the Marine Department, visited the island and authorised the installation of a beacon complex that provides: an entrance lead, anchorage approach, and safe mooring markers.

The complex was based on recommendations by ship's captains, ideas from last year's party, and drawn on a local survey by Phelps and Blezard. Work on the beacons started immediately with the Captain himself lending a professional hand and, at the time of writing, the entrance lead is now established. When completed, these navigation aids will (we hope) represent a part of our gratitude to the men of the U.S.N. picket ships who so gamely keep us supplied with mail and fresh food stores throughout the summer months, and will further testify to the spirit of international co-operation evident in scientific endeavour.

WILDLIFE STUDIES

The intense study of the Royal albatross (*Diomedea epomophora*) is being continued for the fourth successive year and we are fortunate to have Gordon Surrey with us to implement the programme. Gordon, who has done much valuable work on these birds from 1964-66, is expecting banding re-

coveries from earlier chicks, now mature and hence possible breeders. A full banding programme is envisaged for all other species and of note to date is the commencement of colour banding for the Southern skua (*S. skua lombergi*).

Entomological and marine intertidal collections are being made this year; the plankton study, and customary field observations of whales and seals will be continued. With most of the party having an interest in natural history we look forward to producing another comprehensive wildlife report.

IS THE ANTARCTIC CONTAMINATED?

Are persistent chemicals used for pest control contaminating air and water over the whole earth?

Two years ago American scientists working in Antarctica discovered traces of DDT in the bodies of seals, penguins, skuas and fish.

It was suggested that the contamination must have been carried to Antarctica by ocean currents or in the air. But doubts persisted. Since the animal samples were taken near the main American base at McMurdo Sound, it seemed possible that some pesticides could have been accidentally imported and distributed.

So, to check the matter, British scientists of the Office of the Government Chemist in London arranged for samples to be collected by the British Antarctic Survey on remote Signy Island, in the Weddell Sea, far from both British and U.S. bases. The expedition collected penguin eggs, livers and fat of penguins, skuas and shags, and some fish. The samples were deep-frozen and transported to London.

RESULT — POSITIVE

The results of the analysis, published in "Nature", reveal traces of several types of pesticides in all the samples. The most heavily contaminated were the skuas, which range widely scavenging and feeding on fish. Their fat — where these pesti-

cides accumulate — contained up to 25 parts per million of DDE, which is a toxic breakdown of DDT. The Government analysts comment that these "are by any standard very high concentrations to find in the fat of a wild bird".

Scientists conclude that Antarctic waters are now contaminated with several types of pesticide, which has made its way there either in ocean currents or by being evaporated and transported by winds, to fall back to earth in rain.

All over the world the build-up of these chemicals is beginning to be watched with close attention, and those who warn against their indiscriminate use are no longer labelled "cranks".

N.Z. OPINION

Ian Spellerberg, one of the Canterbury University's experienced Antarctic biologists, commented that the report needed clarification.

New Zealand scientists have confirmed findings of United States scientists, he said. "In January 1964 I collected fat samples from Antarctic animals for American scientists, and reports have been published since 1964 on the incidence of DDT found in these animals.

"With our present knowledge we can only speculate on the mode of DDT transport to Antarctica. Several possibilities must be considered.

"Waste disposal at Antarctic bases is a source of DDT contamination of local life, residues may have reached Antarctica by air currents, ocean currents may be a source of transportation, and there is direct contamination of Antarctic waters from breakdown of marine organisms which move freely across the Antarctic convergence.

"I sincerely hope that, if a warning is to be given, it will be in the form of an official report giving all relevant information and be freely available to those concerned," said Mr. Spellerberg.

ANTARCTIC BOOKSHELF



ALL-IN COMPENDIUM OF POLAR RESEARCH

The well-known Polar writer, especially on Antarctic matters, Hans-Peter Kosack has published a large (471-page) volume entitled "*Die Polarforschung*" ("Polar Research"), so far, unfortunately, only in German. Years of patient and able research have provided a unique book of facts, covering all aspects of polar research, including exploration, topography, geology and glaciology, biology, and bibliography. The text serves to link together and clarify the compact, lucid tables. A comprehensive index adds considerably to its value.

Even to one who knows no German, much of the valuable statistical information can be readily followed; but it is to be hoped that this admirable compendium will soon be made available in English and other languages.

Obtainable from Pergamon Press (Australia) Pty. Ltd., 19a Boundary St., Rushcutters Bay, N.S.W., 2011. Aust. price approx. \$20.

MORE PAPERS FROM THE SEDIMENTOLOGICAL RESEARCH LABORATORY

Mention was made in our March issue of the useful productivity of the Sedimentological Research Laboratory of the Department of Geology, Florida State University, Tallahassee, Florida. We have now received three more contributions:

19. A comparison of the Chemistry and Mineralogy with the Distribution and Physical Aspects of Marine Manganese Concretions of the Southern Oceans: by John Bruce Grant.
20. Sedimentation Rate Determination on Ocean Bottom Cores by Gamma Ray Spectrometry: by Lin Davis Pollard.
21. Geochronological Investigations of the Southern Pacific (Report of GA 0246): by C. W. Holmes, H. G. Goodall, J. K. Osmond.

Numbers 19 and 20 are Theses submitted to the Graduate School of the University.

MAGNIFICENT NEW WILSON BOOK

A worthy companion volume to "The Diary of Edward Wilson" reached the editor's desk as this issue was going to press. "**THE BIRDS OF ANTARCTICA**," edited by Dr. Brian Roberts, is a splendidly illustrated volume based upon the journals of Dr. Wilson. The publishers are Blandford Press. A full review will appear in our March issue.

"ACROSS WEST ANTARCTICA"

John Smith Ltd., the Glasgow publishers, announce the publication of a book by the late John Pirrit, describing the exploration of the Filchner Ice Shelf in Western Antarctica during the I.G.Y., 1957-58. John Pirrit, a Scottish glaciologist, was leader of the 1958-9 U.S. traverse party on the 1,400-mile trek from Ellsworth to Byrd, and of the 1959-60 traverse in Marie Byrd Land. He spent two consecutive winters in the Antarctic; in 1959 as scientific leader at Byrd Station. We hope to review this book later.

PUBLISHED IN NEW ZEALAND

TOPOGRAPHY AND GEOLOGY OF THE CAPE HALLETT DISTRICT, VICTORIA LAND, ANTARCTICA, by H. J. Harrington, B. L. Wood, I. C. McKellar and G. J. Larsen. New Zealand Geological Survey Bulletin N.S. 80, 100 pp., 31 ill. (incl. panoramas), charts and diagrams. Folding-map in pocket. The report of the 1956-57 Geological Survey Antarctic Expedition, 1967. Price, paper cover \$3, quarter bound \$3.50.

STRUCTURE OF ANTARCTIC WATERS BETWEEN 20°W, AND 170°W.

Arnold L. Gordon, 10 pp. and 14 fold-out maps: being Folio 6 of the "Antarctic Map Folio Series," American Geographical Society, 1967.

The AGS Antarctic Map Folio Series aims to "summarize in a succinct manner the present knowledge of the Antarctic." Folio 6 serves primarily as a vehicle for an analysis of the work in physical oceanography done up to 1966 by USNS "Eltanin." This vessel has been engaged in a long-term systematic study of the Southern Ocean since 1962 under the direction of the Antarctic Research Program of the U.S. National Science Foundation. At the same time, the publication gives a comprehensive summary of the work of previous expeditions in the area studied. This is a sector of the Southern Ocean between latitudes 50°S. and 75°S. which extends over an arc of 150° of longitude, from the eastern part of the Weddell Sea to the eastern part of the Ross Sea, and embraces the Scotia Sea, Drake Passage and the Southeast Pacific Basin.

The maps of the Folio are well produced on separate 17" x 30" sheets as Polar Stereographic projections on a scale of one to 11½ million. Maps cover station positions, distribution of temperature, salinity, oxygen concentration and bathymetry on the major core layers of regional water masses such as the Antarctic Surface and Bottom Waters, and the Circumpolar Deep Water. Detailed vertical temperature cross-sections across the Antarctic Polar Front (the Antarctic Convergence) and the geographical configuration of the Front through the sector are also mapped, as is the geopotential topography of various isobaric surfaces defining the dynamic structure of the Antarctic Circumpolar Current. Clear examples of the influence of bottom topography on the flow of this current are shown, and the inclusion of a chart of sea floor bathymetry of the region on the same

scale as the other maps would have been useful.

Two other minor comments may be worth recording. The core layer marked by the salinity minimum north of the Subtropical Convergence is called the *Subantarctic Intermediate Water* rather than the *Antarctic Intermediate Water*, a term used almost universally in recent literature. On page 8, under "Identification of the Polar Front," a study of the relationship of atmospheric pressure to the location of convergences, divergences and fronts, due to Koopmann (1953) is incorrectly attributed to Houtman (1964).

The Folio will be a valuable source of reference and New Zealand oceanographers, in particular, will look forward to seeing an extension of this work to the west in a future contribution to this series.

D. M. G.

NOTES ON TOPOGRAPHIC FACTORS AFFECTING THE SURFACE WIND IN ANTARCTICA, with Special References to Katabatic Winds: and Bibliography, by K. B. Mather and G. S. Miller. Technical Report under Grant No. GA-900, Geophysical Institute, University of Alaska, June, 1967. 63 pp. plus maps and diagrams.

Although there are now a considerable number of weather observing stations in Antarctica, the continent is so vast that these are still very widely spaced indeed. As a result, meteorologists analysing and forecasting weather in Antarctic regions must pay very careful attention to the fine details of the weather sequence at individual stations. They must also have a very clear idea as to what effects are due to purely local conditions as distinct from the over-all weather situation.

Surface wind is a very important meteorological parameter, but at a given location the actual speed and direction may be influenced by

SKUA AND PENGUIN RESEARCH AT CAPE HALLETT, 1966-7

by Thomas S. Choate*

Research on Antarctic skuas (*Catharacta maccormicki*) and Adélie penguins (*Pygoscelis adeliae*) has a long history at Cape Hallett—i.e., relatively long as regards permanent station research. Hallett has the rather unique situation of a station built in the middle of a fairly large penguin rookery, and although this has caused some conservation problems, the research subjects are “just outside the door.” The studies of the resident skuas began before and during the establishment of the base in '55-6 and '56-7, and penguin research began in earnest the following year. The base was established as a joint U.S.-N.Z. effort during the I.G.Y. period (only recently has the N.Z. funding been withdrawn—after fire destroyed the Physical Science lab.) and biological research has thus been carried out by both countries. In the case of penguins and skuas, studies have been carried on by U.S. scientists such as Austin, Sladen and Wood and by New Zealanders such as Reid, Kinsky and Cranfield.

* Otago University, New Zealand.

local topographic features. Thus, a single report may give a misleading picture of the general wind over the area.

For these reasons, meteorologists working with Antarctic data will find this report extremely valuable. The authors have analysed wind data for a large number of Antarctic stations, and related them in detail to the surrounding topography. A discussion is presented for each station, together with topographical maps, wind rose diagrams, graphs, and tables. The bibliography of relevant papers is extensive.

D. C. THOMPSON.

The New Zealand biological studies have traditionally been undertaken under the sponsorship of the Dominion Museum. I went down under their sponsorship in '65-66 to start some conservation experiments and “learned the ropes” from Cranfield and Kinsky. But last season the Museum administration had changed and fortunately I was able to get Otago University to take over the sponsorship so that the results of the penguin experiments could be assessed. With the long history of banding of Hallett skuas, it seemed a shame to lose the continuity of population and longevity studies and several aspects of their movements, feeding and conservation needed clarification. So with the kind help of the Antarctic Division who enabled Bruce Willis to assist me, the first Otago University Biological research programme was expanded to include both birds.

There were some delays in transit so that we arrived about November 20 and had only two days to make a preliminary survey of skua nests before starting the annual penguin census. This was carried out and corrected according to the method of Reid (1964). Some comparative figures from his census of 1962 and this season are shown in Table One. The rather continual loss of Adélies is quite clear, amounting to the rather startling figure of 16.8 percent in only four years. If the decline continues at 4 or 5 percent per year for much longer, the impressive rookery at Hallett will be half of its estimated original size in only a few more years (I estimate the base to currently cover some 18% and to have displaced some ten thousand nests).

There are still some one hundred thousand Adélies coming and going on the area and without the annual

census it is somewhat difficult to tell what changes are taking place. Snowstorms buried some adults on nests in 1965 and causes losses this year in areas well away from base disturbance, but the significant losses on the areas near the base (especially areas B and F with 22.3% and 29.0% loss since 1962) point strongly to man as the prime villain.

The experiments which were performed to test man-caused disturbance (see Choate, 1966) were not well controlled, but indicate that handling is one of the severest disturbances, and that penguins have differing temperaments as regards disturbance. Even walking up to a timid bird may cause desertion, while some nested successfully within two feet of a road over which noisy vehicles travelled two or more times a day. Females seem somewhat more susceptible to disturbance than males. Disturbance while establishing nests and laying eggs has the most serious consequences, both at that time and apparently also as regards returning to the same site the following year. This needs further study, but it seems that disturbances later in incubation and during the chick period cause less desertion at the time (but young chicks may be trampled), and a fairly normal number return to the same site the following year. We have too few band recoveries to know where the non-returners go, either in the disturbance season or the season after. The trouble is that even the banding is too much for timid birds. The convenient places to study are isolated small colonies, but these have the highest losses (especially around the edges, see Taylor, 1962) and rapidly dwindle in size until extinction (there is a minimum number for effective predation security).

More work is to be done this coming year on penguin disturbance and population changes.

A temporary but exciting high-light of the season was the large influx of wandering Emperor penguins. The ice breakout was early

this year and this apparently forced the birds moving away from their breeding places to come closer to Cape Hallett. (They prefer walking to swimming!) Once within range, the sound and sight of the Adélie apparently drew them in to the rookery area for at least a few hours stopover. Only a handful visit on an average year but over a hundred came in last season between November 25 and December 9 in groups of up to 18. Most of these were banded in hopes of finding their source as well as to get an accurate count. The only recorded similar year was 1959 when 86 were banded.

The skuas provided the other main research effort of the season, and a prime objective was to have as many of the resident skuas individually marked (banded) as possible so that the relationship of breeding, non-breeding resident, and migratory birds could be clarified. About half of the birds (especially breeders) had been marked in the continuing long-term studies but some of these bands were illegible. So repeated attempts were made to catch breeding birds on their territories, primarily with hand nets. Nooses (snares) were used intensively near food sources (artificial) but primarily selected for unbanded birds. At the end of the first month most unwary birds had been caught and with the inclusion of the many previously banded birds it seemed that at least 75% of the birds had been individually marked. However, unbanded birds began to appear in mid-December in an apparently increasing proportion, so a large (14 x 14 foot) trap was built to catch larger groups of skuas. This had marked success so that within a month the supply of bands (300) had run out while unbanded skuas could still be seen. The trapping provided an opportunity to replace many worn USARP bands from the 1961-2 season and earlier, as well as giving an indication of the attendance by breeding birds at the sources of food around the base galley.

The trapping was carried on irregularly with the help of USARP

Table One.
Comparison of Adelle penguin census and density at Cape Hallett.

		Nests 1962	Nests 1966	Loss 4 years	Density/acre 1962	Density/acre 1966
Areas around the base (A-F) about 34 acres	counted	33979	27666	-18.6%	999	813
	corrected	32518	26975	-17.0%	956	793
Areas east of the base (G-K) about 19 acres	counted	22691	18923	-16.6%	1194	996
	corrected	23061	19251	-16.5%	1214	1013
TOTAL about 53 acres	counted	56670	46593	-17.8%	1069	879
	corrected	55579	46242	-16.8%	1049	872

and Navy personnel from mid-January to mid-February and helped confirm the impression of a fairly substantial movement of non-resident skuas, especially after mid-December. Included were two brown skuas (*Catharacta longergii*), and three (possibly four) migrants previously banded on Ross Island—the first such recoveries at Hallett.

The total population indicated by this banding and recovery work is far higher than previously thought, assuming one can include the mobile group of temporary or post-breeding birds as part of the population. Excluding rebandings and chicks, 236 "new" skuas were banded. A total of 244 recoveries of previously banded birds were made and at least 10 unreadable or doubtful recoveries may be added to this, giving a known banded population of 490 skuas. Conservative estimates of the remaining un-banded birds and unidentified previously banded birds (based partly on breeding proportions) would be 20% and 5% respectively, bringing the total to some 612 skuas.

The breeding population of skuas is about half this number, a similar total to those of previous years. If we take as a criterion of a breeding bird that it was paired and holding a territory for at least ten days, then there were 160 breeding pairs at Hallett in the '66-7 season.

The more strictly breeding group totalled 114 pairs which actually built nests and laid eggs. This included 28 one-egg nests and 86 two-egg nests. Chick mortality was high, especially at hatching (al-

though lower than in 1965-6), and only 40 chicks were alive in mid-January. The 20 percent survival is somewhat lower than that reported from Cape Royds (Spellerberg, last issue) but is not significant considering the much higher nesting density (see Young, 1963).

It is hoped that further trapping this season will clarify this picture of a large mobile non-breeding population, and perhaps bring more recoveries from distant areas.

ACKNOWLEDGMENTS

Besides the special thanks due to Bruce Willis for his faithful assistance throughout the season, I am grateful for technical assistance, transportation and support given by the Antarctic Division, D.S.I.R., U.S. Naval Antarctic Support Force, U.S.A.R.P. personnel, and Otago University. Special thanks to M. Brennan and E. Gless for trapping assistance, and F. Kinsky for skua records and manuscript assistance.

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THE FLIGHT THAT WASN'T

"The first round-the-world flight over both North and South Poles by the Canadian Air Force will be made early next month."

This report in the New Zealand press on October 25 went on:

"The long flight of more than 25,000 miles will take 26 Canadian Air Force officers and men from Ottawa over the North Pole, to Alaska, Hawaii, Christchurch, McMurdo Sound, Antarctica to the South Pole, then through Argentina and Brazil back to Ottawa.

"The plane, a 400 m.p.h.-plus Canadair Yukon, the world's first with swing-tail loading, will stay two days at Christchurch.

"The First Secretary of the Canadian High Commission (Mr. R. M. Robinson) said the plane would arrive at Christchurch early on November 5 and depart for McMurdo Sound at 10 a.m. on November 7.

"The visit will coincide with a Canadian film festival to be held in Christchurch on November 5.

"The flight, the film festival, and the reception are all in honour of Canada's centennial as a Dominion."

The plane reached Christchurch, but did not fly on to McMurdo.

According to a Canadian Air Force officer in Christchurch at the week-end (November 4-5) the flight across the Antarctic had been cancelled because of a fuel shortage at McMurdo Station.

But Captain H. E. Kendrick, the United States Navy staff operations officer, said at Harewood that the cancellation of the Canadians' flight to McMurdo had nothing whatever to do with fuel.

It appears that the Canadians made their initial request to the United States Navy Antarctic Support Force for permission to land at McMurdo, refuel, and be given weather briefings.

The Navy headquarters at Christchurch did not have the authority to approve or disapprove the request so the matter was referred to the office of the Chief of Naval Operations in Washington.

From there the problem was passed on to the State Department and a dispatch was sent back to Christchurch saying the flight could not be approved "due to operational and policy problems raised by the flight."

The policy problems refer to the Antarctic Treaty in which is a clause prohibiting any activities on the continent of a purely military nature.

Byrd Memorial Unveiled in Dunedin

A bust of Rear-Admiral Richard E. Byrd, a gift to the city from the National Geographic Society, was unveiled at Unity Park, Dunedin, on October 31 by Mr. John F. Henning, U.S. Ambassador to New Zealand. The gift commemorates the close connections which the Admiral had with the city during the course of his expeditions to the Antarctic.

In a moving address Mr. Henning said that Admiral Byrd's attainments in the name of science, exploration and peace and his philosophy of exploration came to fulfilment in the Antarctic Treaty which was signed two years after his death.

"This 12-nation treaty," he said, "is a tribute to Admiral Byrd's concept of international co-operation in the worlds of science and exploration. We must never forget Byrd's faith in the basic values of mankind. The bust stands here in tribute to those values for which he lived."

The Mayor of Dunedin, Mr. Calvert, told the gathering that there were only three copies of the bust in existence. Dunedin was honoured to be chosen to receive one of them.

Messages were read by Rear-Admiral Abbot from the sculptor, Felix W. de Weldon, and from the National Geographic Society.

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Out of Print:	Very few left:
Volume 1 numbers 1, 2, 9	number 8
Volume 2, numbers 2, 3, 4, 7, 8, 9	number 1
Volume 3, number 7	number 5

Some other issues are in very short supply. Copies of available issues may be obtained from the Secretary of the Society, P.O. Box 2110, Wellington, at a cost of 50c per copy meanwhile. Indexes for volumes, 1, 2 and 3 are also available, 30c each.

Copies of our predecessor, the Antarctic News Bulletin, are available at 50c per copy, except for numbers 9 and 10. The copies of numbers 1, 2, 3, 4, 7, 11, 17 and 18 are authorised reprints.

The New Zealand Antarctic Society

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 currently two branches of the Society and functions are arranged throughout the year.

You are invited to become a member. **South Island** residents should contact the Canterbury secretary, **North Islanders** should contact the Wellington secretary, and **overseas** residents the secretary of the New Zealand Society. For addresses see below. The membership fee includes subscription to "Antarctic".

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