

# ANTARCTIC

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NEW ZEALAND ANTARCTIC SOCIETY



H.M.N.Z.S. ENDEAVOUR

about to tie up in Winter Quarters Bay. On right, Vince's Cross and Scott's hut.

J. Calvert photo.

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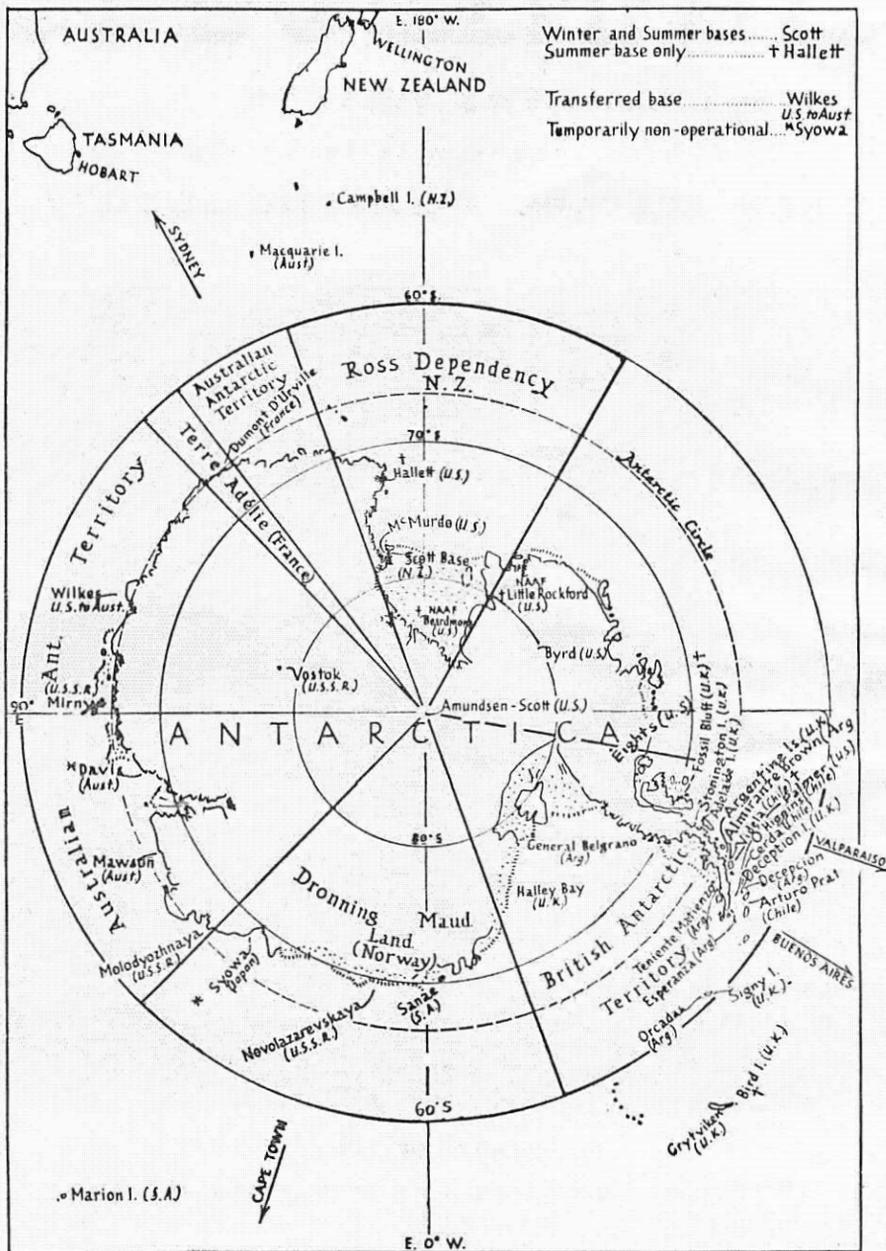
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# "ANTARCTIC"

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# NEW ZEALAND RESEARCH TEAMS SPEND BUSY SUMMER

## "ENDEAVOUR"

H.M.N.Z.S. "Endeavour" has this season completed three cruises, two to McMurdo and one in sub-Antarctic waters.

The U.S. tanker turned N.Z. supply ship left Lyttelton on December 6 loaded with 30 tons of general stores for Scott Base, five tons of cool stores, a tractor, a generator and a sno-trac vehicle, as well as her main load of fuel oil for the U.S. Antarctic Programme. Five days later, 900 miles south of Bluff, she transferred 12,000 gallons of fuel and 38 bags of mail to the weather-picket ship U.S.S. "Mills". This was done during snow squalls and in rough seas.

The first ice was sighted the following day. It grew progressively thicker, with occasional patches of open water but the ship steadily worked south till she met the icebreaker "Glacier" off Cape Royds.

"Glacier" was joined by "Staten Island" and the two icebreakers made a passage for the final leg to an anchorage at Hut Point, only 200 ft. from Scott's historic hut. This was on December 18. Christmas was celebrated alongside the ice.

The homeward voyage began on December 22 and ended at Lyttelton on the last day of the year.

## OCEANOGRAPHIC CRUISE

The vessel left again on January 11 on a purely scientific mission, an oceanographic cruise in the sub-Antarctic.

[We are indebted to Mr. I. N. Estcourt, leader on the cruise, for this note.]

On this cruise the northern and eastern parts of the Campbell Plateau were studied by the N.Z. Oceanographic Institute. Stations were worked along lines from the Snares Islands to Port Ross in the Auckland Islands, from Snares to the Antipodes and Bounty Islands, and from Anti-

podes Island to Campbell Island. The cruise ended on February 5.

Continuous echo sounding records were obtained, and at each station samples of the surface sediment and the benthic (bottom living) animals were trawled. A number of sediment cores were also taken for a study of the history of sedimentation in this area.

Landings were made on Enderby Island in the Auckland Islands, and on Antipodes Island. Shore parties banded nesting albatrosses, obtained geological specimens and collected intertidal animals. The castaway depot on Antipodes Island was in good order and has apparently not been visited since November 1962 when a party from N.Z.O.I. stayed overnight. A brief call was made to collect mail and specimens from Campbell Island where the hospitality of the Leader and personnel of the Meteorological party was greatly appreciated by both oceanographers and ship's company.

The echo soundings have given new information on the morphology of the Bounty-Antipodes area. The Bounty Islands stand on a broad shallow platform which slopes gently down, while Antipodes Island rises abruptly from deep water. The two groups are separated from the 200 to 300 fathom depths of the Campbell Plateau by minimum depths of almost 600 fathoms.

Together with previous ones, this cruise has given sufficient knowledge of the distribution of benthic animals on the Campbell Plateau to allow useful comparative studies. Once the animals have been identified their relationships with faunas of other areas will be studied, both from the viewpoint of the origin and relationships of the New Zealand marine fauna, and by detailed comparison with other local areas such as the



NEW ZEALAND NAVY DIVERS  
examine the under-ice world in McMurdo Sound.

J. Calvert photo.

Chatham Rise which have similar depths and sediments.

Thanks are due to Commander Silk and the ship's company for their co-operation and interest in making this cruise a success.

### THIRD CRUISE

"Endeavour" arrived at McMurdo on February 21 and left again for New Zealand on February 23 carrying the summer support staff. She was due to reach Lyttelton on March 3.

### MUCH IN A NAME

One of the weather observers to be stationed at Wilkes this year is Mark J. Forecast.

### SKIN DIVERS

The "Endeavour" divers wore "wet suits" specially designed for use in Antarctic waters. As is usual, they are of sponge-rubber and absorb water which is warmed by body heat and becomes an insulation against the cold; but these special suits are of a more flexible and slightly thinner material and fit closer to the body.

### TRITIUM CONTENT

Following up Claude Taylor's study of the tritium content of Antarctic snow, Judd flew to the South Pole and Prebble to Byrd late in January to collect snow samples.

### RETIREMENT

Mr. G. W. Märkham, who has been Superintendent of the Antarctic Division since its formation, is to retire shortly.

# THE CENTRAL NIMROD GLACIER GEOLOGICAL EXPEDITION

by M. G. LAIRD

The prime purpose of this expedition was to solve several geological problems which had been raised by earlier work in the general area, and also incidentally to fill in gaps in previous mapping. I had prior general knowledge of the region from a trip south in the summer of 1960-61, and felt that the unexplored northern and western portions of the Holyoake Range, together with the equally unknown Cobham and Swinbank Ranges would be the most likely areas to supply the answers. I felt that it was also important to compare the rocks on both sides of the Nimrod Glacier, so the western side of the Queen Elizabeth Range to the south of the Nimrod Glacier was thrown in for good measure. The total added up to an area of nearly 3,000 square miles, which was to be studied in some detail. For this purpose the party had at its disposal two motor toboggans and four sledges.

We had originally hoped to begin field work on November 1, but for various reasons a start was delayed until November 10. On this date John Chappell (geologist) and I, together with a toboggan and food supplies were flown by Dakota to a landing site at 6,500 ft. on the Polar Plateau, four miles north of the northern end of Cobham Range. This site had been selected for put-in on a reconnaissance flight carried out earlier. Another plane carrying the other two members of the party, Graham Mansergh (geologist) and Dave Massam (mechanic/field assistant), left an hour after us, but did not turn up for another eighteen hours. Because the weather had closed in slightly the pilot had missed the entrance to the Nimrod Glacier and instead flown up a glacier, later tentatively identified as the Lennox-King. Find-

ing no sign of us, the plane returned to McMurdo Sound and tried again later, this time with more success.

With the party finally assembled, and a depot containing seven weeks' supply of food and fuel set up at the put-in site, we headed north on November 12 to a massif ten miles away to begin work. We found that the toboggans were relatively sluggish at the high altitude and it took us two hours to reach our destination.

After two days geologizing here, we returned to the depot, picked up some food and fuel, and headed south along the western flanks of Cobham Range. A week was spent examining Cobham Range and nunataks to the west. We had hoped to visit Half-Dome Nunatak to the south-west of Cobham Range, but a very bad crevasse field prevented this.

## CREVASSE FIELDS

After returning to the depot, we sledged 30 miles down the Prince Phillip Glacier to Cambrian Bluff, a locality I had visited briefly on my previous trip four years ago. The previously unvisited western side of the Holyoake Range was examined on this trip, together with the eastern side of the Cobham Range. The Prince Phillip Glacier gave us our first experience of crevasse fields, but the motor toboggans seemed to handle crevasses well and there were no accidents. We flagged much of the route down the glacier to make our return trip easier, and this, coupled with much probing of crevasse lids and route finding, made our progress slow.

While we were still camped at the southern end of the Prince Phillip Glacier John Chappell fell sick. His condition did not improve after several days so the decision was taken to have him flown out to Scott Base

to recover. A plane carrying the Geologists Range party into the field on November 28 was diverted on its homeward trip to pick him up. John was strapped in his sleeping bags on to the top of a sledge load, cushioned by a lilo, and we returned up the glacier to the put-in site to await the plane, the 30-mile trip being accomplished in 5½ hours. Brian Ahern, Scott Base carpenter, was flown in as field assistant.

### FOSSIL WOOD

The depot was then shifted to the vicinity of the northern extension of the Holyoake Range, and the geology of this area completed. This included an ascent of the 10,630 ft. Mt. Hunt, the highest mountain of the area. Several other lesser peaks were also climbed in the course of the work, the highest being a 9,000 ft. peak four miles north of Mt. Hunt. One of the more interesting features of this latter climb was our discovery of fossilized wood, approximately 270 million years old, near the summit. On Mt. Hunt sandstone containing thin coal seams of the same age rested on top of ancient glacial gravels. Having completed the geology in this area, we moved the depot northwards into the Starshot Glacier, and travelled south-east into a large snowfield separating the Holyoake from the Surveyors Range. This locality also proved very fruitful geologically, the rocks consisting mainly of limestone from which in many places we were able to collect the coral-like 600 million year old fossils called Archaeocyathine.

### LONG WHITEOUT

For the four weeks from put-in until this time the weather had been cold (up to  $-26^{\circ}\text{C}.$ ) but fine, and we frequently worked around the clock to complete a particular section. We all suffered from frost-bite during this period. From December 8 on, however, the weather changed for the worse, and we were dogged by frequent whiteouts for the rest of the period until we were transferred south of the Nimrod Glacier. The first day of whiteout was actually

welcomed by the party, as we all felt we had earned a rest. However, the whiteout lasted on and off for ten days, causing even the least energetic members of the party to be impatient to be off once again. In fact, during the whiteout period, constant watch was kept for the rare clear intervals, and these were used to advantage to move to a fresh campsite area where we could geologize once more. In this sporadic manner we covered the rest of the snowfield and recrossed the Starshot Glacier a few miles above the Starshot icefalls, the glacier crossing itself being carried out in a near whiteout.

It had been intended to cover on foot the 12 to 15 miles down the north-western side of the Starshot icefalls, but the continuing bad weather and consequent shortage of time prevented this. Instead, when the weather cleared on December 18 we moved back up the Starshot Glacier to our depot. Here we spent a couple of days geologizing before selecting a pick-up site in the upper Starshot Glacier on the 20th.

### TOBOGGAN TROUBLE

While we were in the process of completing the local geological work, one of the motor toboggans broke down, fortunately only 1½ miles from the camp, and it was discovered that the body had broken in half laterally, rendering the machine unusable. On examination, the other toboggan showed similar cracking, rendering it dangerous to use, so, having examined all the rocks within a 10-mile radius, we were effectively immobilized until the plane came in, an event which did not occur until December 28. A replacement toboggan and bracing plates for the damaged one were flown in on this date.

Graham Mansergh was scheduled to return to New Zealand at this point, and as John Chappell was still not well enough to be returned to the field, this left me as sole geologist to complete the work on the southern side of the Nimrod Glacier. Three geologists were still working in Geologists Range, however, and it was decided to transfer Murray

Gregory (geologist) from this party to mine, replacing him by a field assistant. At the time of the change-over Brian Ahern was flown back to base to resume his interrupted duties as carpenter, and Dave Lowe (field assistant) was flown out in his place.

### MORE CREVASSES

The reconstituted party was then flown 70 miles south across the Nimrod Glacier to the vicinity of the Queen Elizabeth Range. Unfortunately for a variety of reasons we could not be landed at any of the sites previously selected on the basis of air photographs, and we were instead landed in the Marsh Glacier. The other plane with the two Daves and half the gear aboard landed first, and we watched with horror from above as a line of crevasses opened up behind it as it landed. Our pilot showed disapproval of the landing site, and flew four miles farther up the glacier, finally landing rather harshly on a bump-covered slope after prolonged previous reconnaissance from the air. From a distance we watched the other plane make a rather miraculous take-off, and a short while later our plane had also unloaded and was airborne.

As we had already had a long day, and the visibility had deteriorated, we decided to sleep the night where we were. When Murray and I rejoined the rest of our party next day, we found them camped in the middle of a complex crevasse-field, with the crevasses so close together that our tent in fact had to be pitched over a two-foot wide slot. We discovered that the plane had opened up 14 crevasses on landing and take-off, and had come to rest over a bridged 10-foot wide crevasse where it unloaded.

By the time we had extricated ourselves from this predicament, had negotiated two more crevasse fields in the Princess Anne Glacier, and discovered a sledge route up to the Cotton Plateau, four days had passed without any geology being carried out. However, the rest of the period spent there was very rewarding geologically, the limestone belts to

the north of the Nimrod Glacier being found to continue here as bands of white, cream, and grey marble. With the weather remaining almost constantly fine, we completed the work in this area in a fortnight. On January 13 we were airlifted back to Scott Base, and flown from McMurdo Sound to Harewood on January 16-17, having achieved almost all of our objectives on a highly successful trip.

### DOG-SLEDGING

The other members of the Southern Party, P. Le Couteur (leader, geologist), M. R. Gregory and R. G. Adamson (geologists), and W. R. Lucy (surveyor), were air-lifted with two dog teams on November 28 to the head of the Nimrod Glacier, and spent six weeks carrying out geological mapping of the Geologists Range, a line of peaks inland from the Ross Ice Shelf in approximately 82° 30' S., on the edge of the Polar Plateau.

The geologists found seams of poor-quality coal. Lucy gathered data for topographic maps of the area.

The dogs performed well in an area which ranges in altitude from 5,000 to 7,000 feet. Each dog-team pulled a load of up to 1,500 lb. over ground which varied from soft snow to hard sastrugi. In an effort to collect one section of their geological samples the party had to make a 12-mile return journey across a heavily-crevassed area. For 18 miles of the trek they had to wear crampons.

Lucy's team, the nine dogs totaling 850 lb., had been trained by him at Scott Base during last winter.

The party returned to Scott Base on January 14.

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An **INDEX** for volume 3 is being prepared. Details of binding arrangements will be published as soon as the index is completed. Subscribers should make sure **NOW** that their volume of 12 issues is complete.

# VICTORIA UNIVERSITY RESEARCH IN ICE FREE AREAS

by W. M. PREBBLE

The ninth Victoria University of Wellington Antarctic Expedition was the largest and most varied so far mounted by the university. A seven-man party was maintained in the field, but altogether twelve men were involved including geologists, physicists, a biologist and technicians. The large number of men was required to cope with the many specialised problems that were investigated in selected ice-free areas south and west of McMurdo Sound. After eleven weeks in the field, the expedition was satisfied that its achievements exceeded the most optimistic expectations.

This year the expedition's programme was divided into two distinct phases, requiring a partial change in personnel to cope with the varied problems which would be studied at different localities and at different times. Phase one, the first part of the summer, included Lake Vanda (Wright Valley), Black Island and Brown Peninsula. Phase two, the second part of the summer, included the Koettlitz-Blue Glacier region and Taylor Valley. The team was:

#### Phases one and two:

W. M. Prebble (Leader/Geologist).  
A. N. Baker (Biologist).  
R. A. I. Bell (Physicist).

#### Phase one only:

R. A. Hoare (Deputy Leader/Physicist).  
Dr. P. Vella (Scientific Leader/Geologist).  
J. W. Cole (Geologist).  
A. O. Frame (Technician).  
Dr. A. Ewart, N.Z. Geological Survey, who joined the expedition for work on Black Island.

#### Phase two only:

Professor J. Bradley (Scientific Leader/Geologist).

D. Palmer (Geologist).  
F. Schafer (Technician).  
Dr. D. O. Zimmerman, University of Auckland (Geologist).

Baker became Deputy Leader after Hoare's departure at the end of his work at Lake Vanda. Upon the departure from the field by Baker during phase two, Bell was appointed Deputy Leader. Each person had distinct scientific tasks to perform, but there was, of course, a great deal of familiarisation by each member outside his own field and everyone soon became able to participate in all aspects of the expedition's work. Normally, the party divided each day into two or three groups working on different projects, but occasionally split up into elements which were detached for a few days and which kept in close contact by daily radio communication.

#### PHASE ONE

Phase one personnel arrived at Scott Base on November 13, and a couple of days later Hoare, Baker and Bell were in the field at Lake Vanda. They were there to repeat measurements made by VUWAE 8 in order to determine the stability of the convection cells system in the lake, and to obtain additional information for determining the convection patterns within individual cells. They also planned to study planktonic life known to exist in Lake Vanda, and to carry out geophysical investigations of the immediate surrounding countryside.

#### TO BLACK ISLAND

Vella, Cole and Ewart moved by helicopter to Black Island on the 18th, after spending some days at Scott Base studying the geology of Hut Point Peninsula in the Scott Base-McMurdo area; a familiarisation which was useful in later geo-

logical work. Prebble and Frame remained at Scott Base until all the expedition's cargo had arrived from New Zealand. When it had, a resupply was taken to the Vanda party on November 23 and Prebble and Frame joined their companions on Black Island the same day. Also accomplished in this move was the emplacement of a large supply dump on Brown Peninsula, for use later in the season.

At the end of November, both the Vanda and Black Island groups were moved in a joint helicopter mission to Brown Peninsula, Ewart and Hoare returning to Base. Hoare subsequently guided for a USARP party on the Skelton Glacier. On Monday, December 7, the Hon. Mr. B. E. Talboys, Minister of Science, and Mr. J. T. Andrews, Chairman of the National Research Advisory Council, with Adrian Hayter, Leader Scott Base, and Jack Calvert, visited the expedition on Brown Peninsula. The visit allowed Mr. Talboys and Mr. Andrews to inspect a field party camp and learn something at first hand of Victoria University's activities in Antarctica. Their stay was enjoyed by the expedition members with whom they left mail and goodies from Scott Base.

After several days of blizzard with winds gusting to 60 m.p.h., the party moved to a camp at the southern end of Brown Peninsula to complete the programme for phase one. Vella and Frame returned to Scott Base on December 14. Fine weather allowed the completion of the bedrock mapping before the party shifted to the Koettlitz on December 18. During this move a major supply dump with all remaining personnel was established at Miers Lake and four other depots were laid at strategic positions from Walcott Bay to Garwood Valley. Warwick Prebble's brother, Michael (Deputy Leader, Scott Base), accompanied the party during this movement and returned with Cole to Base.

### PHASE TWO

After some delay in reaching Antarctica, Bradley, Zimmerman, Palmer and Schafer joined Prebble, Baker

and Bell at Miers Lake on December 28. Phase two swung into action with the immediate celebration of a slightly belated Christmas dinner. Work proceeded in the Koettlitz for the next two weeks. Journeys were made by various members in the course of their work north to Garwood Valley and south to beyond Walcott Bay. The Japanese Antarctic Research Expedition, led by Dr. T. Torii, and some of whose members had met VUWAE 8 at Lake Bonney the previous summer, arrived at Miers Lake on January 11.

### TAYLOR VALLEY

VUWAE 9 was moved by helicopter to Taylor Valley on January 13, Baker returning to Scott Base. Arrangements had been made for him to fly back to New Zealand on the 16th with biological samples requiring urgent attention. Work continued from base camp at Lake Bonney with almost unbroken fine weather until January 25 and 26 when the expedition was withdrawn to Base. The party returned to New Zealand on January 30.

### WORK DONE

The expedition is very happy with its accomplishments. Some of the most important scientific achievements include:

The definite identification of the Scallop Hill formation on Black Island and Brown Peninsula as a high-level marine deposit laid down in water, not dragged up by ice; determination of the relative ages of "terraces", marine formations and glacial deposits, and formulation of a sequence representing several glacial advances and the intervals between. Ice movement in the region was probably southward not northward, as previously thought.

Comprehensive bedrock mapping on Black Island and Brown Peninsula with the establishment of a series of different volcanic eruptions.

Assessment of mineralisation within the basement complex rocks of the Koettlitz-Blue Glacier region and Taylor Valley. Traces of sulphide mineralisation, including copper, were found in skarns at four localities but generally the region is lack-

ing in sulphides and is regarded as being unfavourable for large-scale sulphide mineralisation.

Some probable Ferrar Dolerite feeder dykes were discovered in the Koettlitz. New orbicular granite localities were found in the Taylor Valley.

The algal ecology of Lake Vanda and Miers Lake was studied and extensive collections were made of littoral and terrestrial algae, lichens and mosses. A filamentous green alga was found in Miers Lake and preliminary investigations suggest that it is a species of *Olothrix* new to science.

The first investigation of Miers Lake with probable marked differences from the saline lakes of the Wright and Taylor Valleys, and the discovery of a hitherto unreported fine structure in Lake Bonney.

Evidence of post-glacial uplift in the dry valley areas, with important implications on the structure of the Ross Sea region.

#### FOLLOW UP

Several hundred pounds of rocks, biological samples and water were taken back to the university, where investigations are continuing and interpretation of the results is proceeding. Many live biological samples were brought back so that the life cycles of the organisms can be watched.

The ice-free region around McMurdo Sound is still of surpassing interest. Victoria University feels that it has provided an excellent and unequalled field of research in this as in past years and remains a profitable venue for future explorations.

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Geologist **Vic McGregor**, a member of the 1961-62 New Zealand team which explored country south of the Ross Ice Shelf and descended the Axel Heiberg Glacier for the first time since Amundsen, is in Denmark after exchanging ideas with geologists at eight American universities or research institutes en route. He hopes to start field work for a doctorate in West Greenland next summer.

## THE D-REGION PROJECT

J. B. Gregory

In the summer of 1958-9 apparatus was installed at Scott Base, under the direction of Dr. J. B. Gregory, Senior Lecturer in Physics at the University of Canterbury, to measure the height, strength and time of occurrence of radio-wave reflections originating at low heights in the ionosphere.

Within a few months of the start of these observations early in 1959, the apparatus was providing unexpected evidence of a phenomenon, polar black-out or polar cap absorption, which had only recently been isolated by overseas workers, and which was apparently due to the emission of protons from certain flares on the sun. The Scott Base observation showed that these "solar proton events" were more frequent than overseas studies had suggested. During major proton events, the resultant ionization in the polar atmosphere was at heights as low as 40 km., and the consequent absorption of radio waves was giving rise to radio blackouts.

The observations showed that influx of energetic particles is an important factor in maintaining the ionization of the "D-Region" which is located between 50 and 100 km. altitude approximately. This ionization varies with the solar cycle. A further finding was that the emission of particles, which accompanies most larger solar flares, can be detected at the earth after one or more rotations of the Sun. Although alternative explanations are possible, a favoured theory is that these particles have been "trapped" by magnetic fields which originate at the flare site, stretching out into space while still anchored to the Sun. Such a structure of trapped gas and particles ("plasma") is referred to as a "magnetic bottle".

The project has also given evidence on the occurrence of turbulence in the polar ionosphere, between 50 and 85 km. A strong circumpolar westerly vortex exists at these heights during

winter, and the occurrence of turbulent layers is found to be a common feature of these altitudes during winter. The polar vortex breaks down in spring, and gives place to lighter easterly winds during summer. During this season less turbulence is found below 80 km., although above that altitude, it persists, possibly in a westerly flow. Some unusual radio reflections have been detected in summer, originating in very thin layers which are possibly composed of dust.

The project has completed five years' observations at Scott Base. A deterioration in observing conditions, due to an increase of electrical noise at a nearby installation, has marred the quality of later data, and the apparatus, which comprises a high sensitivity fixed frequency pulsed radar, operating at 2.3 Mc/S., has been removed to form the nucleus of a new experiment near Scott Base. A suitable site for the project has yet to be found. This new experiment is intended to measure winds and electron densities in the ionosphere.

The polar lower ionosphere has other unusual characteristics. For example, Dr. Gregory has found that, whereas theory predicts a maximum electron density at maximum elevation of the Sun, the electron density over Antarctica below 85 km. is least in mid-summer. This behaviour is linked with that of the lower ionosphere at temperate latitudes, and is evidence of a major circulation effect which re-distributes ionizable constituents throughout the ionosphere.

Knowledge of all these aspects of the polar atmosphere and ionosphere is necessary before radio communication in polar regions can be carried on with reliability and economy. As sunspot maximum approaches, with increasing number of "blackouts", it is necessary to utilize all available methods, such as V.H.F. forward scatter links, V.L.F. transmissions, as well as the usual H.F. radio. Conversely, since the polar high atmosphere is very inaccessible, any information which can be gained through radio wave techniques on meteorological aspects is of value.

## HUT POINT HUT

Further to the Hut Restoration party work carried out in January 1964, the Huts Restoration Committee decided to complete the work this season and finally leave the building in the form of a memorial. The repairs were thus carried out between December 19 and 22 by R. Smith, a Hamilton architect, and shipwright artificer N. T. Greenhall, who was made available by the N.Z. Navy. Fine weather and the lack of snow around the Hut enabled the work to be carried out quickly, long hours being worked. Repaired windows were replaced, broken or missing timber panels fabricated and fitted, loose roof panels secured, skylight frames cleaned ready for new glass (this was to have been fitted but was delivered the wrong size), a new stove flue was fitted and many other smaller jobs carried out.

Throughout the winter the Hut had been enveloped in dark coloured canvas and the heat build-up inside during the spring had caused ice inside panels and inaccessible roof spaces to melt resulting in very damp conditions; mould was found on seal meat, blubber and timber due to this artificial climate. However, after two or three days with the canvas removed the Hut was dry.

Transport both ways between Lyttelton and Hut Point was by H.M.N.Z.S. "Endeavour" which also provided accommodation at Hut Point, being moored approximately 200 ft. from the Hut on the southern side. During the voyage and stay at Hut Point the officers and men of "Endeavour" were helpful and cooperative at all times and special thanks should go to Commander Silk and Lt. Commanders Verran and Mitchell.

Apart from the skylights and one or two minor carpentry jobs to be carried out by Scott Base personnel the Hut Point Hut is now restored. The final touches were given by E. R. Gibbs, leader of the 1963-64 Restoration team, who replaced stores, equipment, etc., in the hut according

to the recommendations which he and L. B. Quartermain, leader of the 1960-61 Restoration Party, had made and which were approved by the Huts Restoration Committee. In order to guard against the removal of any of these items, so necessary to give the right atmosphere to the historic old hut, the building has been securely locked, but will be made available for inspection by interested people at stipulated times when adequate supervision will be provided. Arrangements for visits will be in the hands of the McMurdo and Scott Base commanders.

### SCOTT BASE

The scientific staff members responsible for the auroral and Beacon Satellite recordings at Arrival Heights had to resort to foot-slogging in November until the "scientific" weasel could be repaired. Every transit of the satellite is being programmed except when the satellite's orbit takes it 1,500 miles away and 600 miles high at its closest approach.

### SUE FOR U.K.

Sue, one of the tractors used by Sir Edmund Hillary on his journey to the South Pole in 1957-58, was flown back from the Pole during the 1961-62 summer and left at Scott Base. Sue has now been "restored" by Scott Base engineer Dave Mills, and was taken back to New Zealand on H.M.N.Z.S. "Endeavour" at the end of last year, en route for the Scott Polar Research Institute, Cambridge, England.

### SPEEDY EVACUATION

While at Cape Royds on the afternoon of December 17, Yeates developed appendicitis. Scott Base 25 miles away was informed by radio. Leader Adrian Hayter travelled to Royds by U.S. helicopter within an hour of the emergency report. Yeates was at once flown to McMurdo hospital and by 11 p.m. he was being flown to Christchurch for hospital treatment, less than three hours after his illness had been reported.

## ISLANDS SURVEY

The combined New Zealand-United States scientific survey of the Balleny and Ross Sea islands referred to in our last issue had not been completed at time of going to press. The team of 13 New Zealand and eight American scientists left McMurdo on the icebreaker "Glacier" and on January 12 work began off *Beaufort Island*, where a shore party carried out survey and biological work.

Short periods were then spent at *Franklin Island* (January 13-15), *Coulman Island* (January 15-18) where the first circumnavigation of the island was made, and "Glacier" reached Moubray Bay on the 18th. On the 22nd a survey team and scientists landed on *Possession Island* and the whole group was reconnoitred by helicopter. A rendezvous was made with "Staten Island" at Cape Adare on January 25 and some days were spent in the Robertson Bay area, which lived up to its reputation—turbulent winds, lack of landing places, dangerous shore travel.

*Sturge Island* in the Ballenys was reached on January 28 where both weather and terrain were found unsuitable for either small boat or helicopter operations. However, a helicopter touch-down was made, the first known landing on this island. New Zealanders Ford and Waterhouse were among the six men who set foot on the island. Two further landings were made later and geological specimens collected.

"Glacier" now made for *Buckle and Young Islands*, but weather conditions were unfavourable for landings. Collecting parties were airlifted to Borradaile Island, where on February 15 a fine collection of algae, also birds and an unusual marble specimen was made. A report on the 17th said that all operations on the Ballenys had been completed. The surveyors made a successful observation for longitude during a landing on Sabrina Island.

A rendezvous with HMNZS "Endeavour" was made on the 18th. This

## THE NORTHERN PARTY

As reported in our last issue, misfortune struck the geological team working in Northern Victoria land on the very day (November 22) of its arrival in the field, when Guy Warren, the leader, broke his left leg.

Dr. P. F. Ballance temporarily took over control and I. McDonald was flown out from Scott Base to assist with field work, until M. R. Ford, an experienced field man, arrived to assume the leadership of the party in Warren's place.

From the R4D aircraft put-in point on the Odell Glacier (approx. 76° 45' S., 160° E.) between Allan Nunatak and the Coombs Hills, where a depot of stores was laid, the party was flown some miles by helicopter to near Carapace Nunatak, where work was carried on for about a week. The four men man-hauled their load to the Allan Nunatak depot on the 29th. The party, finally consisting of Ford, Ballance, Dr. W. A. Watters and Dr. J. A. Townrow of Tasmania, returned to Scott Base on December 23.

The expedition was a successful one. The geologists obtained a very good though not deep section through the Beacon Sandstone at Allan Nunatak, with good Permian and Triassic plant fossils, of which Dr. Townrow made an excellent collection. They also "had a good look" at the Mawson Tillite.

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was followed by profiling over the Macquarie Ridge, and the ship reached Macquarie Island on February 24. A shore party was landed.

## SKUA MAN

Ian Spellerberg, one of the University of Canterbury biological team working in the Antarctic this summer, is continuing the study of the McCormick Skua which he began last year. Skuas have a bad name ("scavengers", "thieves", "penguin killers". The very name "skua" means "pirate"), and the average Antarctic visitor's dislike for them is not lessened by their determined dive-bombing of humans intruding upon their breeding grounds. But those who know the skuas well are ardent counsels for the defence. The extent to which the skuas raid the penguin rookeries for stray chicks and eggs has, it seems, been exaggerated. They are big handsome birds and their fearless assaults on intruders are surely proof of parental devotion and great courage.

Ian is engaged on a skua banding programme: no easy task. Last summer he succeeded in banding 115 adults and 200 chicks. It is very difficult to catch an adult skua, and he is lucky if he can band five adult birds a day. But his efforts and those of the skua-men of other countries will throw light, in time, upon such problems as where the skua goes in winter time. McCormick skuas (the Antarctic species) have been seen off the coast of Japan during the southern hemisphere winter and some have been reported on New Zealand beaches.

## EARTHQUAKE NEAR BALLENYIS

An earthquake was recorded at Scott Base at 1.23 a.m. on December 31. The Base seismograph placed the epicentre close to the Balleny Islands, which straddle the Antarctic Circle almost due south of New Zealand. The D.S.I.R. Seismological Observatory in Wellington recorded the same quake and the Observatory's positioning of the epicentre agrees with that made at Scott Base. As no real earthquakes have ever been recorded as occurring on the Antarctic continent, this is probably the world's southernmost known quake.

## HALLETT CLOSED

When the New Zealanders Rowles, Miller and Martindale who had been "packing up" New Zealand scientific equipment at Hallett Station returned to Scott Base on November 10, the station reverted to the status of a purely American station, probably to be occupied henceforth only sporadically as a summer base for field operations in geology and biology, and as a link in the chain of meteorological stations during the summer flying months. This follows the disastrous fire of March 6 last, in which the main scientific building and the scientific equipment previously operated by three New Zealanders throughout each year, was totally destroyed.

This ends a most happy and valuable co-operative enterprise which began in the 1956-57 summer. The base on Seabee Spit, Moubray Bay, was constructed and maintained logistically by the United States, but New Zealand was responsible for the programme in ionospherics, seismology, geomagnetism and the greater proportion of the auroral programme and every second year a New Zealander was Station Scientific Leader:

1957	U.S.A.	J. A. Shear.
1958	N.Z.	K. W. Salmon.
1959	U.S.A.	R. Roberts.
1960	N.Z.	R. B. Thomson.
1961	U.S.A.	R. W. Titus.
1962	N.Z.	C. B. Taylor.
1963	U.S.A.	H. Freimanis.
1964	N.Z.	N. M. Ridgway.

Before the fire, Hallett had had many exciting moments during its eight years' history. During its construction in the 1956-57 summer, the U.S.S. "Arneb" was nipped and holed by ice. During the 1958 winter Hallett was the first Antarctic base to recognise in its auroral records the effect of the atom bomb test in the Pacific. On October 16, 1958, a Globemaster coming in for an air-drop to the station crashed on high country 30 miles to the north and six of the men aboard lost their lives. On May 24, 1960, winds gusting to 140 m.p.h. caused serious damage to the build-

ing. In November 1963 two helicopters were blown from their moorings and badly damaged.

As the "Antarctic Report" of the U.S. Antarctic Research Program says: "Hallett Station, in addition to its contribution to a network of scientific observations in atmospheric sciences and its usefulness to logistic operations in the Ross Sea area, has been a unique symbol of international co-operation." There will be very general regret that "the cost of refurbishing, re-supplying and maintaining the station is not commensurate with its scientific contribution"—the reason assigned for the decision to "discontinue winter scientific programs" at the station after February of this year.

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## MEN OF LEARNING

In this summer season's New Zealand Antarctic research programme field parties there are seven scientists with doctorates, one professor, four from overseas studying on scholarships at New Zealand universities, and science degrees are held by many others.

One of the scholarship students is a United States Fulbright Scholar, two are from United Kingdom universities, and one from Australia.

## RUGBY

The South Island won the inter-island Antarctic Rugby match at Scott Base, 6-3.

The match was played on the McMurdo ice shelf at 77° 51' S on January 23.

Light flakes of snow fell thickly during the first half, and throughout the match the temperature was 29 deg. F., with a slight northerly breeze.

Both teams wore mukluks (rubber-soled canvas Antarctic boots).

Spells of 15 minutes were played each way.

The opening try was scored by the captain of the North team, carpenter Brian Ahern.

Both the South Island captain, Doug Foster-Lynan, and scientist Trevor Sanson scored for the South Island team.

## IN ADELIE LAND

Dumont d'Urville suffered further bad weather in November with heavy snow-fall. The average wind speed was 35 km./h. with gusts of more than 200 km./h. The sea ice, firm up till mid-November, steadily deteriorated, leaving the sea smooth up till the beginning of December.

In spite of these unpleasent atmospheric conditions the preparation of Marret Base was actively carried on. Two weasels were on the glacier and a quantity of material was sent on to Cap "Prudhomme".

The relief ship "Thala Dan" left Hobart on December 6 and arrived at Dumont d'Urville on December 11. On board were M. Rolland (Administrator-in-Chief of French Antarctic Territories), P. E. Victor (Director of Expeditions Polaires Francaises), Professor Pedoya, and Dr. C. Lorius, Leader of the new (15th) Expedition; also the majority of the members of the expedition, 21 comprising the summer party and 11 to winter over.

### SUMMER WORK

As soon as unloading ended, on December 16, the summer programme was begun. This included the installation of a 50 m. tank for the storage of fuel oil and the erection of dormitories.

Meanwhile the scientific programme was carried on, and the three biologists took advantage of the good weather to push on with their observations.

At the end of February "Thala Dan" returned to pick up the members of TA 14 under M. H. Morin, and the summer party. The latter will go back to France by air. Members of the 1964 wintering team will return to France on the "Thala Dan".

One of the more important assignments of the new team is to make the first survey of the magnetic anomaly—the difference between true South and magnetic South. This has received considerable attention in the northern hemisphere but very little work has been done on it in the Antarctic.

During the final two weeks of "Thala Dan's" stay the weather was excellent: "lovely sunshine and no wind".

"Thala Dan" returned to Tasmania on January 4, to allow three passengers to travel to Hobart by launch from Piersons Point, near the entrance of the Derwent River. The ship then went on to Melbourne.

### WOMEN = WORRIES

The veteran French Polar explorer, Dr. Paul-Emile Victor, sees it this way. He told reporters in Hobart in December that women would not be accepted for Antarctic work—"The Russians and the Americans have tried it," he said, "but it did not work out.

"Women make excellent scientists, and they are physically fit to go to such places. However, in an Antarctic base emotional problems would occur between men and women, and this would not exactly help our scientific work.

"We already have enough worries and I see no reason why we should help to create new ones."

### ANOTHER NOVEL?

Mr. Billing is just in time. The Melbourne "Age" announced on October 31 that Miss Jo McDonald, an Australian who has been living for four years in New York, has written a novel entitled "Gabriel", the action of which takes place in French Antarctica, Adelie Land.

### BOWLED OUT

We were wrong—and we are delighted to know it. In our March 1962 issue we stated that Mr. C. R. Ford and Mr. C. H. Hare were the sole survivors of Scott's 1901-04 "Discovery" expedition.

We now learn from Mr. Hare himself that "Jimmy" Dell, a "Discovery" A.B., is also alive and well in England. An English officer, Lt.-Cdr. A. R. Ellis, in a letter to Mr. Hare, says that he met Dell and had an interesting conversation with him.

## OPERATION DEEP FREEZE 65 AHEAD OF SCHEDULE

By early February the U.S. Army Aviation Detachment, the U.S. Navy and the National Science Foundation were able to report the completion of all Deep Freeze 65 programmed work — almost a month ahead of schedule.

Most of the work done by the Army unit was for geological surveys of different areas, during which flight crews had become adept at identifying rock types and formations, including a topographic mission near David Glacier, then geological missions, support for Dr. Wade's party in the shadow of the mountain named after Dr. Wade many years ago, and finally support flights for the Ohio State geologists in the Wisconsin Range of the Horlick Mountains.

Accidents occurred, but none of a vital nature. Two helicopters crashed in three days, making a total of three for the season, while an Otter and an R4D also ran into trouble, making an unprecedented record of mishaps in Deep Freeze's ten years of operation. However, only one injury was recorded — a minor sprain suffered in the R4D crash.

Life photographer Mike Rougier fell and was injured in the Shackleton area and was flown out to base.

At both McMurdo and the South Pole new facilities for aircraft operation were used for the first time. At the Pole a Hercules on January 1 made the first instrument controlled approach in fog which reduced visibility to about two miles, using the newest of the three ground control approach systems on the Antarctic continent.

At McMurdo even TV is now in operation — not for amusement, but at Williams Field. Pilots today, due to fly into the heart of the continent, get a visual weather briefing from the meteorological headquarters at McMurdo Station.

So at the beginning of February Deep Freeze technicians opened a television station, Station WTFO, a

closed circuit system, which receives weather charts and diagrams of cloud cover sent from Weather Central and is thus able to brief pilots comprehensively at the airport.

A 25-square-mile ice floe threatened to block the channel to the Antarctic's main logistic base at McMurdo Station, at the end of January. To avert this, the Coast Guard Cutter "Eastwind" butted this extra-large "ball" across ten miles of sea into the open water of McMurdo Sound. This effort took "Eastwind's" 10,000 horses two days' pushing, which is not surprising in view of the fact that the floe, measuring 6 miles by 4 miles, was estimated to weigh between 80 and 90 million tons, about 150,000 times the displacement of the ship.

### CHANGE OF COMMAND

Rear-Admiral F. E. Bakutis, commander-designate of the U.S. Navy Antarctic Support Force, arrived at Harewood, N.Z., early February, en route to the Antarctic where he was to spend 12 days on a familiarisation visit before taking over command in April.

Stating that no great change in the scope or size of the Antarctic task force was likely, Admiral Bakutis said that the change of command will probably take place in Washington at the naval dockyard.

### DISTINGUISHED CAREER

Admiral Bakutis, who is 52, married with three children, is a distinguished naval aviator credited with 11 planes shot down and many ships damaged. He wears the Navy Cross with Gold Star (bar), the Bronze Star with combat citation, the Air Medal and six Gold Stars.

Shot down while attacking a Japanese destroyer he drifted in a small raft for seven days before being rescued by an American submarine. He took part in attacks on the out-post islands of Japan, and his squadron, on the U.S.S. "Enterprise", was awarded a Presidential Unit Citation for its work under his command.

He is a specialist in anti-submarine warfare.

### NO WOMEN!

Antarctica would remain the womanless white continent of peace as far as he was concerned, the Admiral told women journalists at a Wellington Press conference.

"I have no intention of rocking the boat at this early stage," he said.

Admiral Reedy will become commander of Carrier Division Two, a unit of the U.S.-Atlantic Fleet, flagship the nuclear aircraft carrier U.S.S. "Enterprise".

## NEWS HIGHLIGHTS FROM U.S. STATIONS

### McMURDO

McMurdo's face lift goes on. Fresh water flowed into its reservoirs at the rate of 11 gallons a minute this summer, as the Antarctic's first salt water distillation plant came into permanent commission. As yet the distillation is achieved by means of two giant boilers, but once the new core is in service with the nuclear power plant waste steam from the unit will be used. Two hundred men of the Mobile Construction Battalion 6 (C.O. Lt.-Cdr. H. A. Tombari) have erected the plant on Observation Hill; water will be pumped 340 ft. from the sea to it, and water consumption will no longer have to be restricted to 3,000 gallons a day. With the plant's possible output of 14,000 gallons daily, mod. cons. will replace the old, more primitive ones.

A 2,000 Kw diesel generator plant, a heated garage and the already-being-constructed warehouses, earth-science and glaciology laboratory, quarters for senior scientists and 10-bed dispensary with operating-room and dental facilities will add further to McMurdo's star rating, which will also involve the replacement of all the Jamesway accommodation huts.

### A REAL ROAD

Perhaps the feature that would most amaze the re-incarnated Polar Hero of 50 years ago is A Road. Antarctica's first finished road, metalled even if not paved, now welcomes the Antarctic arrival at Williams Field and allows him to travel the 1.6 miles to McMurdo itself without the bone-

shaking agony of the previous commutation. "Antarctic 6", so named in deference to its builders, Mobile Construction Unit Six, rises from 20 ft. above sea-level at the ice shelf edge to 203 ft. at McMurdo, and demanded 91,000 cubic yards of fill for the 6,000 cubic yards of crushed rock surface, plus three culverts, seven spillways and a bridge, a bridge 12 ft. long by 25 ft. wide spanning a gully 7 ft. deep.

### BYRD

Two major projects were scheduled for Byrd Station this summer. One was the installation of a system which will correlate information from the satellite "Pogo", due to be launched early this year, with similar information from the ground. The information from Pogo will be on electromagnetic phenomena, that from Byrd normal ground-based magnetic activity.

A large steerable dish antenna on a site some half-mile from the station, operated by two wintering-over scientists, will provide the basis of this readout facility.

Scientifically, the largest project for Byrd this summer will be the installation of a ten-mile antenna some 14 miles from the station, to facilitate the study of very low and extremely low frequencies. Three parallel dipoles, the centre one ten miles long, the outer five to seven, will be laid out several hundred feet apart on the snow surface.

## AMUNDSEN-SCOTT

Seventy-eight thousand pounds of metal have been assembled in the rarified air and extreme cold of the South Pole Station by three men working in the snow-laden wind where a garage used to be before fire destroyed it last year. From the mass of metal the only Low Ground Pressure D-8 tractor ever assembled there took shape.

Intended as a replacement for the tractor lost in October's fire, the RD-8 had been shipped in sections from McMurdo to the Pole by U.S. Navy Hercules aircraft and lay for three weeks passive and inert on the snow, while its three manufacturers cleared their beards and moustaches of ice, and fought with sluggish oil, frozen heavy clothing, shovelling water and unloading aircraft at the same time as they assembled the metal monster in temperatures so cold that to touch it with bare hands left flesh sticking to metal and in so high an altitude that any exertion reduced them to gasping desperately.

Finally the last nut was attached and after a long period of pre-heating the giant tractor blade dipped and the machine made its first cut into the "ground"—RD-8 had a heart. Now it needed a home.

## EIGHTS

A record temperature of 36°, eight degrees above the previous all-time high, was recorded at Eights Station in December, but even this warmth had a dampening effect. Ice on the roofs of buildings succumbed to the sun's caress and found its melted way through cracks in ceilings, to make men below think they were suffering mirages, a supposition which came true three days later when three mountain peaks known to be below the horizon and a fourth not known to be anywhere appeared in view before their amazed eyes. Still, things could have seemed worse. Reports of other mirages elsewhere in the continent—brought about by atmospheric conditions—spoke also of mountains appearing in sight, but upside down.

## PALMER STATION

The new Palmer Station, the sixth United States scientific station in Antarctica, is taking shape on Anvers Island off the coast of the Antarctic Peninsula, in latitude 64° 30' S., 63° 30' W., 700 miles south of Cape Horn.

On January 15, the icebreaker "Edisto" broke through to Norsel Point at the southern tip of the island and was joined by "Wyandot" with stores for construction of the station which will house five USARP scientists and four Navy men for the winter, in place of the summer complement of 23. It is expected that Palmer Station will be fully operational by the end of the season in March.

Palmer Station is the only U.S. Antarctic station north of the Antarctic Circle, and will have a much warmer climate than the other five. Anvers Island offers biologists two grasses and a herb to study for effects of harsh weather on plant life, as well as mosses, lichens, fungi, liverwort and algae. Five varieties of penguin live on the island, together with other birds, and the surrounding waters also supply ample material for study.

## RESEARCH TRAWLER

As an adjunct to Palmer Station, the U.S. National Science Foundation proposes to build a 120-ft. research trawler for work off the Antarctic Peninsula near the station.

## PLATEAU STATION?

Plans are being made for the establishment early next year of a small scientific station in the heart of Queen Maud Land. The station will, it is hoped, be set up at the end of the second leg of the 5,000-mile, four-year traverse from the Pole station to Roi Baudouin Base on the Queen Maud Land coast. It will be used mainly for meteorological and glaciological studies and will probably be occupied by up to a dozen men.

Like Eights Station, the projected plateau station will be flown to the site in ready-made housing units.

## FIRST LEG OF TRAVERSE

The first leg, of some 900 miles, in the planned four-year traverse of Queen Maud Land has this summer been completed by a nine-man multi-national party, which has zig-zagged over the southernmost part of the Antarctic's last unvisited territory.

Starting from the U.S. Research station at the South Pole, the party, comprising leader, Dr. Richard L. Cameron, Ohio glaciologist; a Belgian and a Norwegian glaciologist, two glaciologists and two engineers from Wisconsin, a magnetician-navigator and a physicist, covered the area to near the Pole of Inaccessibility, Antarctica's farthest inland point. This major traverse was accomplished, despite mechanical faults, with the use of three 10-ton Sno-cats, providing the only shelter available including the kitchen, and four rolli-trailer sleds each carrying 500 gallons of fuel, plus ordinary sledges and periodic air-drops.

Unexpectedly low temperatures towards the end of the traverse forced the party to curtail the planned distance to be covered, after having achieved some 30 miles daily since its start on December 5 last year, 30 daily miles of flat, featureless whiteness, gathering basic scientific information about the two-mile thickness of ice, and what lay even beyond that, beneath their tracks.

### JOURNEY'S END

The traverse concluded with "the most exciting event" of the tour, according to Dr. Cameron—their arrival at an abandoned Soviet camp near the Pole of Inaccessibility, just one small hut surmounted by a 20 ft. high drilling tower supporting a life-size bust of Lenin.

Inside the hut, belying its church-like appearance from the distance, the traverse party found cigarettes and matches left there for them, a note in English describing the station and its fuel and food caches and another reminding them to "lock the door on leaving". A Soviet traverse, knowing of the intended American trip, last year visited the station and left the welcome there. In return, Dr.

Cameron made some glaciological measurement asked for by the Russians in earlier correspondence.

### LABORIOUS, MONOTONOUS

Apart from an extra hour for dinner on Christmas and New Year's Days and carol singing on Christmas Eve, the daily round on the traverse had been hard and monotonous. Digging or drilling through many feet of hard snow, continuous instrument reading, and riding (and maintaining) in un-Pullman-like vehicles for some 20 hours, often without regular meals made keeping alive and doing their jobs a laborious routine.

A cross-sectional view of the icecap and land beneath was the aim of the geophysicists, whose blasting and shock-wave recording indicated the presence of hilly ground beneath the ice, even the previously-announced (by the Soviets) mountain range.

Snow accumulation was the main interest of the glaciologists, who found that annual precipitation at the Pole of Inaccessibility (a title it can no longer claim?) is little more than one inch of water contained in three inches of snow.

### HOME AGAIN

On February 1 a United States Navy Hercules picked up the nine men, who left their machines, drained of oil and sealed against winter rigours, stored at their last camp, ready to be dug out, preheated and used on the second leg of the traverse, which is planned finally to reach the Belgian base Roi Badouin, in the 1967-68 summer.

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### LIFE'S FARTHEST SOUTH

A miniature garden in a temperature high enough to melt the snow, complete with lichens and a tiny spider-like creature alive in an area nearer the South Pole than any other native, have been found only 309

miles from the Pole in the Queen Maud Range by a team from the Bishop Museum.

Discoverer of this minute form of life was New Zealander K. A. J. (Keith) Wise, who has had a busy time in the Antarctic this summer. In November he was at Hallett with the head of the Museum's Department of Entomology, Dr. J. L. Gressitt, where he found many insects and free-living mites. In early December, after Gressitt's return to U.S., Wise went with J. Shoup to the Shackleton Glacier, between 84° and 85° S., to examine melt-water ponds; in this area were found rotifers, algae, moss, lichens, as well as springtails and mites, some in altitudes of 4,500 ft., and all farther south than had previously been recorded. In the Horlick Mountains only lichens were found, but finally at 85° 30' S., Wise found, at the Robert Scott Glacier, more mites.

#### "ELTANIN"

Further proposals cover the immediate future base of the 3,886-ton research ship "Eltanin", recently in Auckland undergoing a refit.

It is planned that "Eltanin" effect four cruises in the South Pacific between Wellington, N.Z., and Valparaiso, Chile, its present base, this year, then one or two moving-up cruises in the Scotia Sea, south of South America. These completed, "Eltanin" may use Wellington as her base for cruises south from N.Z.

Considerable modifications, as well as routine re-fit operations, were effected in "Eltanin" while in Auckland, to facilitate changes in her scientific programmes. Upper atmosphere studies and measurements on very low frequencies have called for extra radio equipment and antennae, while the effect of radio noise on sensitive equipment has brought about further modifications: special sonic profiling equipment for the measurement of the thickness and nature of seabed sediments and underlying rock was also installed.

#### WINTER FLIGHTS?

So successful was the mid-winter flight from Harewood to Antarctica

to evacuate the injured American Seabee by Hercules aircraft last June that not only speculation as to the feasibility of regular winter trips to break the six-month isolation has resulted. Serious discussion between the U.S. Navy and National Science Foundation has also considered this possibility.

A considerable problem such flights would be. Last year's flight, planned down to the finest detail, despite the urgency of the situation, still owed a large part of its success to luck—or Providence. However detailed the planning, however comprehensive its coverage, factors of weather could be neither guaranteed nor even sufficiently certainly forecast. But the possibility remains.

#### THE SHAPE OF ANTARCTICA

Concluding the six-season project of field investigations in the mountains of West Antarctica aimed at determining the nature of the Antarctic land mass and directed by Dr. Campbell Craddock, a three-man team from the University of Minnesota this summer explored three major groups of nunataks between the Ross and Weddell Seas.

Mountains of marble and indications that the nunataks form the highest peaks of a ridge separating the two seas were amongst the findings of the team, which comprised two geologists and a New Zealand biologist, Roger Buchanan. Buchanan, born in Dunedin and trained at Lincoln College, sought primitive insects and plants sometimes found beneath Antarctic rocks, but found none.

The Pagano nunataks, the Hart Hills and the Whitmore Mountains rise some 3,000 ft. above the ice cap north of the Horlick Mountains, and help to cast doubt on the theory that West Antarctica beneath the ice is a series of islands, not half a continent. The ridge which they are now thought to surmount appears to extend from continental East Antarctica, and this throws still further doubt on the old theory of water link under the ice between the Ross and Weddell Seas.

party with all its gear from the U.S. to any part of Antarctica in a matter of days instead of months," he said. "And they carry what we formerly considered luxuries, such as ordinary food instead of trail rations." The Mountains showing large expanses of exposed rock. He thought then this valley could provide elsewhere ice-concealed information on the structure of Antarctica.

"Twenty-five years ago the senior scientist of Rear Admiral Byrd's Antarctic expedition saw from the air a wide valley in the Queen Maud Mountains showing large expanses of exposed rock. He thought then this valley could provide elsewhere ice-concealed information on the structure of Antarctica.

This season, Dr. F. Alton Wade, now professor of geology at Texas Technological College, fulfilled his ambition and has returned from that valley, the Shackleton Glacier, with 1,500 lb. of specimens plus sufficient information to complete a geological map of it.

"1965 is definitely my last year," said 62-year-old Dr. Wade. "I told my wife that 1941 would definitely be my last year in Antarctica. Then I had to return to the Shackleton Glacier, so I told her that 1963 would definitely be my last year. I returned this season to finish that work and, though I hope to send a party to the far south in the future to follow up other Byrd expedition discoveries, 1965 is definitely . . ."

Dr. Wade has enough material to keep him busy at home for many years. A wealth of detailed geological material will fill in the Queen Maud part of the Antarctic picture, he says, and will prove that that range was not caused wholly by uplift but also in part by subsidence of surrounding land.

Furthermore, the reduced thickness (1,100 ft. less) and speed of flow of the Shackleton Glacier is yet another indication that Antarctica is "slipping out of the grip of its ice age. Perhaps after some 10 thousand years it will have farms and forests." Today, however little the Antarctic itself may have changed since the time of Byrd's second expedition in 1933, its exploration has been revolutionized, says Dr. Wade. "Planes of Operation Deep Freeze can fly a home.

## THE HOMING PENGUIN

The homing penguin's task is an easy one compared with that of the penguin heading back to its nesting ground. At least the penguin can see, weather permitting, and can travel as the crow flies. Not so the penguin, which may have hundreds of miles of sea to traverse, dodging any land masses that may be in the way, before it reaches its nesting ground. Investigations already made have traced a bird released 2,400 miles from its home, which returned in eight months, but it has not been easy to trace a penguin's route over land and water.

## TRACKED BY RADIO

This year, with the help of fascinating pilots, aircrewmembers and shop personnel from Deep Freeze Air Development Squadron SIX, a Johns Hopkins University scientist, Dr. Richard L. Penney, has been trying a new method of tracking these persistent home-lovers — penguin radio transmitters.

To his own design, these special radio broadcasting sets are attached to the flippers of penguins taken from hundreds of miles from their nesting grounds and then set free to trace their passage back for the listening scientist at a central receiving station. Thousands of miles from home, groups of penguins have been waddling across the whiteness, each with its transmitter under its flipper, while above them investigators in VX-6 aircraft follow them by radio reception and map their progress

## ICE AGE PASSING?



THE NEW LOOK AT "PORT McMURDO"  
Winter Quarters Bay this summer. From left: Scott's hut, H.M.N.Z.S. Endeavour, U.S.S. Glacier, Pte. John R. Towle, U.S.C.G. Eastwind. Behind the ships, road and oil line constructed this year.

U.S. Navy Photo.

## LONG FLIGHT

The longest exploratory flight (5,090 miles) yet made within the Antarctic continent was completed on December 11 when a ski-equipped Hercules returned to McMurdo, with Admiral Reedy aboard, after making a round trip from McMurdo, across Queen Maud Land to the Sor Rondane Mountain range and on to the western extension of the Shackleton Range.

The purpose of the flight was to explore an ice cap whence strong radar returns had been recorded in October, 1963 during Admiral Reedy's flight from Cape Town to McMurdo, over the Pole.

The Hercules (Cdr. M. E. Morris) was ski-equipped and carried a maximum load of fuel demanding jato power to become airborne. Equipped for trimetrogon photography the aircraft landed at the Pole Station to re-fuel and then photographs were taken to fix the location and facilitate the charting of peaks discovered last year and thought to be a western extension of the Shackleton Range 80 miles away to the east. Two specially designed flagpoles carrying the U.S. and Admiral Reedy's personal flags were dropped over the peaks recording the circumstances of the flight, and were last seen with flags streaming in the wind.

## CO-OPERATION

United States Antarctic co-operation with other nations has this year kept up its record. Each year the National Science Foundation arranges to send U.S. scientists all over Antarctica through the assistance of other countries, while foreign scientists join with the Antarctic Research Programme.

Argentina, Australia, Belgium, Chile, Germany, Japan, New Zealand, Norway, United Kingdom, South Africa and the Soviet Union will all work with the United States, exchanging scientists at home and in Antarctica, giving mutual assistance with transportation, and logistic support, and observers and representatives will attend meetings and discussions.

## FLYING DOCTORS

The Australian Flying Doctor Service has a rival in the Antarctic, where within little more than a week two men, injured on the ice, were rescued and flown back to N.Z. by the U.S. Army Aviation Detachment under the leadership of Major William Hampton.

At the end of November, New Zealander Guyon Warren fell and broke his leg while leading a N.Z. geological party, and had to be rescued and returned to Harewood.

On December 1 another mishap occurred. The Army Aviation unit shifted its base camp from McMurdo to the Shackleton Glacier just in time to rescue Life Magazine photographer Mike Rougier from a ledge on the mountainside to which he had fallen, injured, while attempting to photograph the unit in action. He certainly found a way to see it.

With rotor blades whirling at, at times, less than three feet from the cliff face and with only a portion of one skid on the rock near the injured man, an Iroquois helicopter achieved the task of rescuing Rougier who was flown to McMurdo before being evacuated to Christchurch.

## BASIC TRAINING

Inspector L. D. Bridge and the three other experienced mountaineers of the Federated Mountain Clubs of New Zealand again gave instruction in snowcraft, icecraft and survival techniques to nearly 50 members of the United States Antarctic Research Programme. The field training was carried out on the coastal cliffs a few miles east of Scott Base between October 18 and November 2. Results, say the instructors, were "first class": "it was rewarding to see the transition from novice class to confident movement."

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## A NEW VOLUME

This issue of "Antarctic" is the first number of volume 4.

See announcement on page 6 and inside back cover.

# NEVER A DULL MOMENT IN THE AUSTRALIAN ANTARCTIC

Closing one station, re-siting another, forced landings, a huge ice breakout, searching for men marooned by blizzards, an aircraft sinking through thin ice: all these have been taken in their stride by ANARE men in the course of a full Antarctic programme this summer.

The ship "Nella Dan" left Melbourne on December 2 for Macquarie Island and returned to Melbourne on December 16. It again left Melbourne on December 22 for the Antarctic Continent. Before calling at Mawson to relieve the 1964 Party, it had been intended that the ship would carry out extensive coastal exploration in Enderby Land, west of Mawson.

Meanwhile, the "Thala Dan" had left Melbourne on January 8 for Wilkes Station. On board were eight French scientists to be dropped at Dumont d'Urville Station after which the ship sailed for Wilkes and then Davis where it arrived on January 23.

On January 6 and 7, "Nella Dan" was jammed in pack ice sixty miles N.N.W. of Taylor Glacier. On the evening of January 7, the weather permitted the leader, Dr. Phillip Law, and Captain Hans Petersen to make a helicopter reconnaissance of the ice. It was found that sixty miles of unbroken winter fast ice was separating the ship from her objective at Edward the Eighth Gulf where survey and geological studies were to be done. Dr. Law revised the plans and decided to carry out the reliefs of Mawson and Davis stations before the exploration instead of afterwards.

"Nella Dan" broke out of the pack ice on Friday, January 8, at 5 p.m., proceeded S.S.E. and moored to the edge of fast ice, thirty miles north of Tilley Bay. During Friday two helicopters flew twenty sorties of 30 to 60 miles each, landing four geologists and an assistant with equipment at the Taylor Glacier area. After a useful day's work, two of the men were left camping there to continue their investigations.

## UNLOADING UNDER DIFFICULTIES

On January 9, Law, Dalton and Whiting discovered a suitable fast ice airfield 12 miles to the east. The ship moved in and unloaded the Beaver aircraft which Whiting, with surveyor Kirkby, flew to Mawson airfield, carrying out aerial photography en route. Thus some difficulty in unloading the Beaver at Mawson was overcome. Meanwhile, helicopters flew McLeod and Cook to the Stefansson Bay area for more geological work and later to the off-lying islands. The ship sailed for Mawson in open water at 5.20 p.m. and arrived soon after midnight. After entering the harbour, the ship was prevented from mooring by the sudden rise of an off-shore wind and she had to put to sea. The ship returned in the afternoon and moored safely.

## FORCED LANDING

While transporting a surveyor inland to Mount Twintop on January 12, a helicopter piloted by Captain Saw was forced down. Saw made a good running landing on the slippery blue ice of the plateau near the Masson Range, without damage. The machine returned to Mawson after the fault was rectified.

In the operation this helicopter, and one piloted by Treatt, established a tellurometer survey station on the peak of Mount Twintop at 4,500 feet. Other stations were also established, one on Lucas Nunatak at 2,800 feet and one north of Mawson on Bechervaise Island. Separated by distances of about 20 miles, these stations will provide trilateration measurements and theodolite observations to assist with a survey of

the Framnes Mountains. Each station was manned by two men, each pair camped on an exposed eyrie.

Also on January 12, a Beaver aircraft piloted by Whiting flew 200 miles south of Mawson to carry out aerial photography of the Athos and Porthos Ranges of the Prince Charles Mountains. This flight occupied 5¼ hours. Geologists Wallis and Cook had camped at Casey Range and geologists Trail and Lachal at Taylor Glacier. These men were later transferred to Stefansson Bay and Bypass Nunatak respectively.

### LONG STORM MAROONS FIELD MEN

These five two-man parties were stormbound for six days at their tent camps on mountain peaks near Mawson in winds of from 50 to 75 m.p.h. At the end of the period supplies of food and fuel were running low.

On January 14, the wind arose and flying became impossible. That night surveyor Maruff and his assistant, Foley, who were camped at Baillieu Peak, failed to make radio contact with Mawson and, as the storm increased in violence, concern was felt for their safety. On January 16, a relief party of four men in two snowtrac vehicles, led by Martin, set out through the storm to try to reach Baillieu Peak. However, by 1500 hrs. on January 17 they were immobilized by drifting snow and dangerously crevassed terrain.

The men at Mawson waited anxiously for the storm to abate. Finally, on the afternoon of January 19, the wind dropped sufficiently to allow three helicopters to make flights to check on the situation at each camp site. All men were found safe and well.

### SURVEYORS RETURN

A report on February 24 said that after weeks of arduous and dangerous work the four surveyors of the National Mapping Division had successfully completed a highly accurate survey traverse over a distance of 300 miles extending from Mawson through the Framnes Mountains, Baillieu Peak, Fram Peak, Leckie Range and Rayner Peak to Mount

Mueller in Kemp Land. The surveyors, led by Syd Kirkby, together with four assistants from Mawson Station, had worked from January 10 at distances up to 100 miles inland on the Antarctic Continent. Landed by helicopter to camp in inland mountain ranges, they made long daily climbs with heavy loads to prominent peaks from which tellurometers were used for distance measurements between the peaks.

Weather imposed severe limitations upon the helicopter operations and during periods of storm, survey parties huddled in tiny tents in blizzards up to 80 m.p.h.

This accurate line survey will form the basis for a series of detailed maps of Kemp Land and MacRobertson Land.

### BIG ICE BREAK-OUT

A major change has occurred in the south western coast of Prydz Bay. Three thousand square miles of Amery Ice Shelf have broken off sometime during the last two years and floated away in the form of giant icebergs. Phillip Law, reporting from the "Nella Dan", said the ship sailed along the new edge of the Amery Ice Shelf and plotted its position by radar. As a result of the breakout, "Nella Dan" was able to penetrate to within thirteen miles of Mount Caroline Mikkelsen at the bottom of Prydz Bay and to obtain important cartographic information. Such an approach has not previously been possible for any ship.

The "Nella Dan" cruised for sixty miles along the edge of an immense iceberg off the coast of Kemp Land on February 7. The full extent of the berg was not known but it measured at least 90 miles by 30 miles. It ran in a north-westerly direction from a position 66° 11'S., 61° E.

It is believed that the iceberg is a major part of the breakaway from the Amery Ice Shelf. This huge berg has jammed numerous icebergs and extensive fast ice in the approaches to Edward the Eighth Gulf, preventing the expedition ship from reaching its objective.

### BEAVER AIRCRAFT DITCHED

On the very same night the Beaver broke through a weak patch of sea

ice while taxiing from near the ship to its take-off strip. On board were the pilot, Whiting, and passengers Corry, surveyor, and Miller, radio operator, who were to have been landed on Rayner Peak for surveying. They barely managed to scramble out of the cabin before the aircraft settled beneath the sea. The high level wing resting on the surrounding ice prevented the plane from plunging to the bottom. Men pushed inflatable sausage sections from the expedition's rubber pontoons beneath the wings and inflated them by a pneumatic line from the ship. When the aircraft was thus safeguarded from sinking, Captain Petersen carefully manoeuvred the "Nella Dan" to break through the fast ice until it was level with the stranded plane. The ship's derrick then hoisted the Beaver out of the jumbled ice on to the deck of the ship.

The accident occurred off the coast of Kemp Land and about 250 miles west of Mawson. The expedition's programme of survey and geology was curtailed by the loss of use of the Beaver but it was continued on a reduced scale, using three helicopters.

### DAVIS CLOSED

Davis Station was closed on January 25 after being manned for eight years.

The Director of the Antarctic Division, Dr. Phillip Law, lowered the Australian flag in the presence of a small group of Mawson and Davis men.

Davis Station has been left in a condition ready for occupation if needed.

The decision to close Davis Station coincides with the decision to build a replacement for Wilkes Station, which has been deteriorating.

### THE DAVIS STORY

It was Dr. Law who established Davis on January 13, 1957, as one of a series of Antarctic weather stations set up for International Geophysical Year. The base is built on the edge of the Vestfold Hills, a 300-mile oasis of ice-free rock 400 miles east of Mawson. The hills are studded with lakes and dissected by fjords.

At first the base was manned by only five people, making it the smallest full-time station in Antarctica. In recent years the staff grew to eight — four weather men, two radio operators, a doctor and a cook.

### EXPLORATION CENTRE

Some exploration work has also been undertaken at Davis. Dog-sled teams have penetrated more than 200 miles inland, setting up satellite weather stations.

The base, 14 huts grouped close together, is considered the best planned of Australia's three Antarctic Stations.

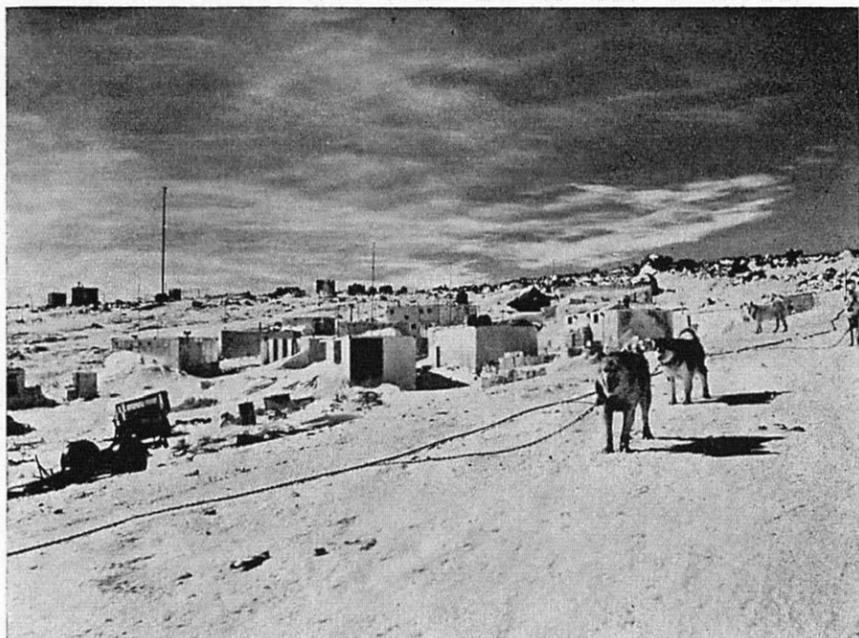
Davis is strategically well placed. Half-way between Mawson and Mirny, the Russian base, it is one of the few spots in Antarctica where an airfield could be built on rock.

The Antarctic Division hopes that Davis will be re-opened within a few years.

### NEW WILKES STATION

This year at Wilkes a start will be made on the construction of the new station to replace the present one which is gradually being buried by snow accumulation over the last seven years. Engineering and surveying experts from the Commonwealth Department of Works, the Division of National Mapping and the Antarctic Division were to complete the preliminary surveys, prepare the site and erect the first buildings before the onslaught of winter.

The construction of the new station, which is only 1½ miles away across the bay south of Wilkes, will necessarily take some four years because the summer construction period is so short. The design is a co-ordinated effort of the Works Department, the Aeronautical Research Laboratories of the Department of Supply, the University of Melbourne and the Antarctic Division and contains novel features designed to counteract the effects of snowdrift accumulation. Wind tunnel and other tests have been made to determine the best design features. The original ideas produced will be tested during the coming winter and will be of great interest to other nations with stations on the Antarctic continent.



ANARE Photo, G. Newton.

## ANTARCTIC STATIONS

### 1. MAWSON

We begin a series of illustrations of the principal Antarctic stations with a photograph of the Australian base Mawson, the first ANARE station on the Antarctic Continent. Mawson, named after Australia's Sir Douglas Mawson, one of the great Antarctic explorers of the Heroic Age, is on the coast of the Antarctic Continent south of the Indian Ocean. It is located on the eastern side of Holme Bay, Mac-Robertson Land. It stands on a horse-shoe-shaped rock outcrop with arms enclosing a deep harbour (Horseshoe Harbour), between Mount Henderson and the Masson Range, in 67° 36' S., 62° 53' E.

The site was selected by Phillip Law, using aerial photographs, and after examination from the air on February 2, 1954, a camp was established there on February 9 under Robert Dovers and his wintering party in weasels from the "Kista Dan." The station was formally opened by Law on February 13, and when the vessel left on the 23rd three huts were completed and the

wintering party of ten were comfortably established.

The station has been in continuous occupation since and has grown considerably over the years. By 1956 there were 26 huts and it now consists of 48 buildings, well spaced out to avoid the dreaded fire. The wintering over party now usually numbers about 27.

Ice conditions are unpredictable. In 1954, "Kista Dan" had to charge her way not only through heavy pack ice but through a belt of fast ice 20 miles wide. But usually by February the winter ice has broken out from the coast and access is relatively easy. Sometimes even by late January all the ice has gone out and on a fine day men may enjoy boating on the harbour and bask in the heat radiated from the dark rock. But in case access should be completely barred, a two-years' reserve of provisions is always kept on hand.

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The site chosen for the new Wilkes Station is on a rocky outcrop on the north side of Bailey Peninsula in the Windmill Islands (66° 17' S, 110°

# The Belgian-Dutch Expeditions

The Danish Polar ship "Magga Dan" sailed from Antwerp on December 6 to carry the new Belgian-Dutch expedition to the Antarctic.

Three Dutch and two Belgian members of the expedition were on board. The 34 other members joined the ship at Cape Town. The winter party numbers 16, of whom six are Dutchmen. Four of the team have served previously in the Antarctic. These include Ken Blaiklock, the 37-year-old British surveyor and geologist, who was with the British (F.I.D.S.) expedition in 1948-51 and 1952-55, the Trans-Antarctic expedition in 1955-57 and the Belgian Antarctic expedition in 1959-60.

The ship arrived at Base Roi Baudouin on January 12 after an easy voyage through the open pack ice. Although some difficulties were experienced with the Bay ice going out, the unloading of the ship was finished by January 24.

The new winter team which comprises several Antarctic veterans officially took over Base Roi Baudouin on February 3. This short ceremony was marked by the presence of Baron G. de Gerlache (Chairman of the Belgian Dutch Antarctic Committee) and the observer Mr. A. van der Essen.

The 17 men of the 1964 expedition (leader L. Cabes) had a very successful wintering over and carried out completely the intended scientific programme. The new King Baudouin Base built by them is very well established.

Next day "Magga Dan" sailed for Cape Town. Most men boarded the ship by helicopter, the bay ice now being gone completely.

The time between the arrival of the ship and her departure from Base Roi Baudouin was very successfully used by the different groups of the summer personnel to

carry out the planned summer programmes. On the whole, this work has been carried out according to plans (see December issue of *Antarctic*) and the summer programme can be considered as highly successful.

Baron G. de Gerlache acted as co-ordinator for the relief operation between the 1964 and 1965 expedition and for the planning of the summer programmes.

## OCEANOGRAPHY

(Leader A. Capart)

In addition to several stations between Cape Town and Antarctica an extensive oceanographic survey took place in the coastal waters of Base Roi Baudouin. An underwater T.V. set was experimented with and proved interesting.

In addition to these physical oceanographic studies the seal and penguin population was studied. Several penguins and two seals (one of which died on the way back) were sent back to Belgium. Their quarters had been arranged in the refrigerated holds of the "Magga Dan."

## PHOTOGRAMMETRY

(Leader Prince A. de Ligne)

The aircraft was damaged while being unloaded from the ship. The aircraft mechanics skilfully repaired it. Several photo runs (oblique photography) were made in the eastern part of the Sor Rondane mountains where sufficient photo coverage was still lacking.

The photographs will be used to complement the existing ones in the construction of a new map of this area. Owing to bad weather the planned photographs of the coast had to be abandoned.

## SOR RONDANE TRAVERSE

(Leader T. Van Autenboer)

The traverse (7 men) reached the mountains after an easy journey from the Base, travelling with two Polaris Sno-Toboggans and one Muskeg.

Later, the Alouette helicopter joined the party and was used for transport and reconnaissance work. The Cessna aircraft flew in the supplies (mainly helicopter fuel) from the Base.

32' E).

The present Wilkes Station is in position 66° 15' S, 110° 31' E and was constructed by the United States in early 1957, control being transferred to Australia in February, 1959.

The geologists made detailed studies of certain areas and took several 100 lb samples of "key" units for radiometric dating. A detailed study of morainic deposits was made with the hope of contributing to the chronology of the deglaciation. Orientated samples of chosen units were taken for palaeomagnetic studies. Several snow and ice samples were taken for isotopic analysis.

The surveyors reoccupied the glaciological stations put up during the 1959 and 1960 Belgian Expedition. Most of the markers were recovered although a few have disappeared. This will allow a thorough check over periods ranging from 4 to 5 years on the velocity measurements already obtained on the glaciers in the western part of the range.

New stakes for future observations were set up. Another survey party was flown out to the eastern part of the range and was successful in obtaining another astro position. Some of the party were flown back to the Base while the vehicles were back at the Base on the morning before the departure of the ship.

After the departure of the ship, the news received from Base Roi Baudouin indicates that the 1965 Expedition has been successful in recovering the three generators from the old Base. The latter is now covered by 8 metres of snow.

The new buildings for the meteorological programme and for the ozone measurements have been completed, and the surveyor of the winter party has started his topographical work in the neighbourhood of the Base.

The leader of this year's team is M. Winoc Bogaerts, an engineer, who was a member of an Arctic Ice Station expedition in 1962-63. Summer plans include work in geology and geodesy in the Sor Rondane Mountains and oceanographic work in Breid Bay.

The expedition is well equipped with transport: a Cessna 180 single-engined aircraft, an Alouette II helicopter, three Sno-cats, two Polaris motor-toboggans and a Muskeg.

Base Roi Baudouin was established as a Belgian base in December 1957 and evacuated in February 1961. It was re-occupied by a Belgian-Dutch

## WHALING POOR

An Oslo message dated January 26 states that the whaling season, which started in September, has resulted in much lower catches than last season.

### LEASE RENEWED

An Edinburgh report on January 4 stated that the Scottish firm of Charles Salvesen, of Leith, near Edinburgh, had renewed the lease of the Antarctic whaling station at Leith Harbour, South Georgia, to a Japanese whaling company and would provide the Japanese with technical aid at the station over the next three years.

The station was previously leased to the Japanese whaling company, Nippen Suisan Kaisha Limited for the 1963-64 season.

Salvesen sold the last of their whaling factory ships to the Japanese company in August 1963. Japan now has a quota of 52 per cent. of the total world catch of whales.

### VISIT TO MIRNY

Rear-Admiral J. R. Reedy paid a seven-hour visit to the Russian Base, Mirny, on November 5-6, accompanied by Dr. G. Meyer, who is to winter at the Soviet station, the fifth American scientist to do so. The Hercules aircraft left McMurdo at 8.25 a.m. and reached Mirny at 2.15 p.m. The American party was driven to the station and had breakfast of steak, ham, cheese, potatoes, black bread and coffee.

Forty Adelie penguins were collected at Fulmar Island to serve as "guinea pigs" in the projected navigational study on the Ross Ice Shelf.

### ICE

Some 99 per cent. of the ice on the earth is concentrated in polar ice sheets, and 91 per cent. is in Antarctica. — C. Lorius in S.C.A.R. Bulletin, May 1964.

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expedition in January of last year. The base is located in 70° 25' 53" S., 24° 18' 38" E.

# TENTH SOVIET EXPEDITION BEGINS OPERATIONS

The change-over from the 9th to the 10th Soviet expeditions was safely effected early in the New Year, the ships employed being again the "Ob" and the "Estonia".

The Leader of the tenth Soviet Antarctic expedition is Dr. Ye. S. Korotkevich. Seventy men will be wintering at Mirny, with Dr. I. G. Petrov as the Chief, including 30 scientists, of whom one is an American, one is a Pole and one is a Hungarian.

Novolazarevskaya has 14 men on the staff, headed by Dr. Yu. A. Kruchinin; ten of them are scientists, including one from Czechoslovakia.

Vostok has 15 men, headed by A. V. Shirochkov; ten of them are scientists, including one from Czechoslovakia.

Molodezhnaya is headed by A. B. Buretsky and has 44 men on the list, including 11 scientists, of whom two are from the German Democratic Republic.

## SHIP MOVEMENTS

The "Ob" departed from Leningrad on November 26, 1964; spent the 10th and 11th December, 1964, in Dakar (Senegal); arrived at Mirny on January 5, 1965, and left on January 26. On January 30 the ship explored the new border of the Amery ice shelf. On February 2 the ship arrived at Molodezhnaya. After visiting Novolazarevskaya and again Mirny the ship will leave Antarctica in the second half of March. The crew is headed by V. Ledenev, a geographer who has participated in previous expeditions.

The "Estonia" left Leningrad on December 4, 1964; arrived in Aden on December 21, was in Fremantle on January 3-4, 1965, and spent from the 11th to 24th of January at Mirny. She arrived back in Fremantle on January 31. By means of special equipment on board, Soviet geophysi-

cists will be able for the first time to make a study of the intensity of cosmic rays along the vessel's entire course.

The personnel in Mirny was changed on January 23, 1965, and in Vostok on January 22, 1965.

The main task of the Expedition, says "Vodny Transport", will be the completion of the complex research work on the coast and inside Antarctica according to the programme of the I.Q.S.Y.

The temporary base Komsomolskaya, half way between Mirny on the Pravda Coast and the Geomagnetic South Pole (Vostok), will operate during the Antarctic summer. It will keep in touch by radio with snowcat teams and aircraft working in the depth of the continent and will supply them with meteorological information.

Of special interest will be the medical study of man's acclimatization to the severe Antarctic climate.

After leaving Mirny the "Ob" arrived at Molodezhnaya after being delayed by a severe snowstorm off Enderby Land.

On board were 57 members of the Soviet expedition and also a Czechoslovak scientist, Stefan Pinter, three geophysicists from the German Democratic Republic—Hans Wirth, Klaus Lindner and Klaus Elstner—and the American microbiologist George Meyer.

The ice barrier on to which supplies for Molodezhnaya were unloaded last year has crumbled away and the expedition is now looking for a suitable place to land supplies.

The "Ob" is carrying prefabricated houses, panel sections for a garage, a workshop and a power plant, as

well as other supplies for the new centre.

After unloading about 1,500 tons of supplies and equipment and taking on board the men who have completed their period of duty, she will go on to Novolazarevskaya in Queen Maud Land, about 1,900 miles from Mirny, where men and supplies will also be landed. Oceanographical studies will then be conducted in the Southern Indian Ocean.

Men who arrived on "Estonia" have taken over Vostok. Planes conveyed them from Mirny, together with the first supplies from the "Ob".

### EXCHANGE

Igor Zotikov, a Soviet physicist, is joining the United States expedition in Antarctica. He will winter at McMurdo and will conduct a year's cycle of investigations concerning the thermal condition of glaciers.

This is the eighth exchange of scientists between the Antarctic expeditions of the U.S.S.R. and the United States.

### EARLY JOURNEY

A weasel-sledge transport left Mirny for Vostok on October 16, 1964, and arrived at Vostok on December 2. On December 10 it left Vostok, and returned to Mirny on January 13, 1965.

### STATIONS RE-OPENED

An earlier report (December 1) in "Sovietskaya Rossiya" described the appearance of the disused Pioneer-skaya Station, opened in 1956 and closed in 1959. "The station is covered with a thick blanket of snow. Only the three radio masts are visible together with the top of the aerological pavilion, and a heavy truck-tractor which took part in earlier inland expeditions. After getting into the station through the aerological building and along a narrow snow tunnel the visitors connected the knife switch on the power switchboard and immediately several bulbs lit up."

After another 18 days they reached the unoccupied Komsomolskaya Station and Fiodorov, who will be in charge of this station during the summer season, with three mecha-

tics, began the re-opening process. Inside the buildings the temperature had reached 50°C. below zero (-58°F.). With all the sources of heat switched on it took 24 hours before the temperature rose to +7°C. (44.6°F.).

Soon the call signs were answered by Vostok, Novolazarev and Mirny.

On December 8 "Sovietskaya Rossiya" reported the arrival of the train at Vostok, and gave some particulars of the conditions there.

Eight heavy truck-tractors and the powerful "Kharkovchanka" cross-country vehicle were harnessed to the sledges, whose 100-ton load consisted of scientific equipment, fuel, etc., for the use of the wintering-over staff.

Vostok Station has two poles: the Geomagnetic South Pole and the Pole of Cold. It is here that the absolute minimum temperature was fixed, 88.3°C. below zero. In these conditions metal becomes brittle like glass, diesel fuel becomes solid and rubber hoses and cables break at a slightest twist.

From the previous experiences of the wintering-over staff we now know that polar explorers who have been acclimatized, i.e., who have lived through several months here with the temperature 76°C. below zero, feel relatively well, but each degree below that is felt particularly badly.

The explorers live in small buildings well insulated from the cold by a reliable heating system. Outdoor periods of stay during severe frosts are limited to 15-20 minutes. Special masks, in which the air is warmed up before entering the respiratory organs, together with special clothing, enable the staff to carry on scientific observations even during the severest of frosts.

In addition to excessive frosts the staff at Vostok Station are subjected to extremely low atmospheric pressures. To get used to these one needs not only a strong physique but also a strong mind.

In the latest radiograms received from Vostok Station the expedition members report a warm welcome from the wintering-over staff.

## MOLODEZHNYAYA'S NEW LOOK

As mentioned in earlier issues, the Enderby Land station, Molodezhnaya, is ultimately to have enhanced status as a scientific station. Work to that end has begun, and a group of builders was sent to the base this year. More than 40 men will spend the winter at Alasheev Bay on which the base stands.

The plans for converting Molodezhnaya into "the capital city of the Antarctic" were explained to a "Trud" staff writer by Ju. A. Chabarov, Director of the Department of Arctic and Antarctic Research. "A whole township will spring up at Molodezhnaya," he said, "with its industrial and residential quarters. It will be situated not far from the sea and it will be 2 km. long.

"We have already chosen the site for the diesel power plant and the store where fuel and lubricating materials will be kept. Fuel will be stored in containers specially manufactured by specialists of the Neft-espezmontazh Combine to withstand the pressure of the snow. Each container will hold 700 to 1,000 M<sup>3</sup> of diesel fuel. Material for six of these containers has already been sent to the Antarctic, where they will be assembled.

"Delivery of fuel will be made once every two or three years by tanker, then transported to the storage site. An airfield is also being planned, capable of taking heavy cargo planes. Although air transport will be largely used in order to enable expedition members to reach their destinations more quickly, we are looking for a suitable bay on which to build a wharf. Preparations are being made to build a powerful radio-meteorological station. Sixteen sets of dismantled radio masts ready to be assembled have been sent to Molodezhnaya.

"Although in time the major part of our research will be carried out at the new Molodezhnaya Station, other stations will continue their work with somewhat reduced programmes."

## BIG BREAK OFF

At the beginning of February a Tass correspondent reported from Mirny that a huge mass of ice had broken off from the Amery shelf glacier in the eastern part of the Antarctic. According to preliminary data the northern edge of the glacier has now retreated over 40 miles to the south. The area of the mass which has broken off is estimated at about 425 square miles.

This important change in the Amery glacier was first discovered by the pilot of an IL-14 plane, Arkady Bertsynsky, during a flight from Mirny to Molodezhnaya. It was investigated by explorers who, on a clear day, without any wind, approached the scene on the "Ob". The scientists made observations at three hydrological stations and measured the depth of the sea by the new edge of the glacier (from 380 to 500 fathoms).

The results of the observations will be incorporated in the atlas of the Antarctic which is being published in the U.S.S.R. towards the end of this year.

## ANTARCTIC PERIMETER

The length of the Antarctic shore line was accurately calculated recently by two Soviet geographers — Vladimir Bardin and Inna Suyetova. According to their calculations, the perimeter of the continent has a total length of 30,030 kilometres (about 18,660 miles). Until now it had been believed on the basis of calculations made in 1960 that the shore line was about 28,000 kilometres long (17,400 miles).

Inna Suyetova has also calculated the total volume of the ice of Antarctica (23,920,000 cubic kilometres). This figure includes the shelf ice. The average thickness of the ice covering is 1,710 metres (just over one mile).

## GEODETTIC TRAVERSE

A geodetic traverse along a 100 km. profile was made from Mirny, with the participation of scientists from the German Democratic Republic from January 1 to February 5, 1965.

### NEW RESEARCH SHIP

The Soviet M/S "Academician Knipovich", a new research ship, of 5,000 tons displacement, will soon set out on its maiden voyage from the port of Sevastopol.

Professor Yuli Marti, D.Sc. (Biology), the head of the expedition which will work on board the new ship, told a correspondent:

"The 'Academician Knipovich', the first boat of a series of special ships, will permit comprehensive exploration of fauna and flora in any region of the world ocean and at very great depths.

The ship has 12 excellently equipped laboratories, trawls for catching and research and modern fish-finding instruments with TV and photo devices for underwater observations. The ship can conduct oceanological investigations even in heavy seas.

"The research boat has also an experimental plant for processing sea products and aquariums for observing the life of fish and invertebrates.

"The maiden voyage of the 'Academician Knipovich' will last more than eight months during which she will cover some 60,000 km. in the Mediterranean, sub-Antarctic waters and the Indian Ocean.

"The expedition will study raw-material resources of the tropical zones of the Atlantic Ocean and the waters adjacent to the Antarctic, the bottom relief, the type of soils in these regions, the composition and distribution of water and the origin and location of fertile areas, that is, places with high productivity. There will be investigated the peculiarities in biology and the behaviour of commercial fish. Research will also be made in perfecting the methods of catching and fish processing."

### AND A NEW FACTORY SHIP

A large new refrigerated factory ship, christened the "Salna", is to go to the Antarctic to join the "Yugi Dolgoruki" fleet, pick up a full load of whale meat and deliver it to her home port. "Salna" is commanded by Serghei Goriachev, the first Latvian master of a fishing vessel to go to the Antarctic.

### HELPING THE WHALERS

One of the main tasks is the transmission of information on weather conditions in Antarctic waters to the Soviet Antarctic whalers. Plans for the 10th expedition include provision for an increase to the meteorological staff at Mirny Observatory. The information gathered on climate and atmosphere circulation in the Antarctic is being successfully used in the analysis of aerial synoptic charts and weather forecasts.

The hydro-meteorological staff on the whalers "Sovietskaya Ukraina", "Yuri Dolgoruki" and "Sovietskaya Rossia" have at their disposal modern scientific equipment and a phototelegraphic receiver. This enables them to receive from Mirny twice daily the synoptic charts of the Southern Hemisphere and the weather reports from Australia, South America, Africa, and the sub-Antarctic islands.

### ABOARD "ESTONIA"

When "Estonia" called at Fremantle (on the same day—January 3—as last year) Australian reporters elicited some points of interest:

About a third of the crew of 90 are women.

Station leader for Mirny, Dr. Ivan Petrov, has spent 18 years working in the Arctic, but this is his first trip to the Antarctic.

On board were 137 scientists and technicians.

Two Japanese joined the ship at Fremantle in order to inspect the Japanese Showa Base.

"Estonia" normally carries tourists between Leningrad and London.

### LONG FLIGHT

A gull has turned up at a Soviet Antarctic station more than 625 miles inland, Tass reported on December 17. It appeared to be "very tired" and a Soviet expert said this was the first time a bird had been seen so far inland in Antarctica.

## CZECHOSLOVAKIA IN THE ANTARCTIC

Two Czechoslovak scientists will again winter with the Soviet expedition, the sixth time Czechs have participated in Soviet Antarctic activities. Last year two Czechoslovak geophysicists, Messrs. Chaloupka and Konecny, were members of the 9th Soviet Antarctic Expedition. The two new men are:

J. Skok (32), a member of the staff of the Safarik University, Presov. He is a cosmic ray expert whose special interest is the variations in the neutron and ionized portions respectively of cosmic rays. He will be wintering at Vostok Station.

S. Pinter (25), a geophysicist, is a member of the Academy of Sciences, whose special interest is the micropulsations of the earth's magnetic field. He will be studying their relation to the aurora. Mr. Pinter will also be conducting research on Whistlers. His station will be Novozarezskaya.

The two Czech scientists left Prague by air on November 9 for Leningrad, sailing on the "Estonia" on December 4. They reached Mirny on January 11. In a message dated January 20 Pinter said that Skok had already gone on by air to Vostok.

Last year's Czech participants, Mr. Konecny and Mr. Chaloupka returned to Europe by the vessels "Ob" and "Estonia" respectively.

An attractive 150-page book intended for general reading was published in Czechoslovakia in 1963 entitled *Nasi v Antarktide, Our Men in Antarctica*. It is lavishly illustrated, the plates including 13 in colour, and is a striking indication of Czech interest in Antarctic research. The co-authors are Antonin Mrkos, Stanislav Bortl, Oldrich Kostka and Oldrich Praus.

More extensive scientific reports will be published in due course.

[We are indebted for this information to a reader in Prague who has kindly forwarded a copy of the book.]

## SOUTH AFRICAN NEWS

The South African Antarctic vessel RSA (1550 gross tons) was due to leave Cape Town on December 29, and to call at Marion Island to disembark a biological expedition before proceeding to relieve the 1964 team at SANAE. The 1965 team will comprise 14 men under the leadership of J. T. J. van Wyk.

Included in the programme for this summer is an over-snow traverse to Trolltunga Glacier Tongue on the meridian of Greenwich, and the grounded area to the south-east of the old Norway Station; also an extension of the inland geophysical traverse beyond 72°S.

The team will also continue the reconnaissance mapping of the bedrock geology and geomorphology of the Ahlmannrygen and the Borgmassifet in western Dronning Maud Land.

## OUT OF THE PAST

Before he died, on July 7 last, Professor R. W. James, who was an honorary member of the South African Antarctic Association, contributed to the Association's "Antarktiese Bulletin" an article on his experiences with the members of Shackleton's "Endeavour" expedition who were marooned on Elephant Island in 1916.

He concludes an account which one wishes were longer with an account of the rescue. "Thus the winter passed, not unpleasantly. We were dry and warm and not actually hungry . . . but we had read and re-read our few books and I fear that our mental existence was not very brisk. At last on 30 August, 1916, just as we were sharing out a stew made of seals' backbone and seaweed, a small steamer appeared out at sea. . . . Within an hour we were sailing northwards towards Punta Arenas . . . hearing of the madness of a world at war, from which we had been cut off for two years."

## ARGENTINE MOVES

The icebreaker "General San Martin" was scheduled to leave Buenos Aires on November 2 and to visit Ushuahia, Decepcion, Almirante Brown, Melchior, Teniente Matienzo and back to Ushuahia; then on December 19 to visit Orcadas, General Belgrano, Ellsworth, Ushuahia. A third cruise commencing on January 29 was to take in the Mar de la Flota, Gerlache Strait, Bismarck Strait, Marguerite Bay and as far as Peter I Island. It was planned to reconnoitre the northern part of Alexander I Land and to inspect the General San Martin Base, returning to Buenos Aires on March 23.

"Bahia Aguirre" was to leave Buenos Aires on December 7, visit Ushuahia, Decepcion, Almirante Brown, Melchior, Esperanza, Orcadas and return to Ushuahia. In the course of this cruise Esperanza Base was to be relieved. "Bahia Aguirre's" second cruise involved hydrographic research in the Mar de la Flota and Gerlache Strait, from January 12 till March 6.

"La Argentina" was to visit Deception Island in the course of a training voyage for cadets of the Naval College.

The Commander of the Antarctic Naval Group is Capitan de Fragata D. Gonzalo D. Bustamante.

The major task for the 1964-65 summer is the construction and establishment of the Almirante Brown naval base as a scientific station equipped for special attention to biological research. The Officer in Charge will be Sr. Alfredo Corte.

Argentina has inaugurated a new "refuge" near Esperanza Base (63° 24' S, 56° 59' W), Hope Bay, on the east of the Antarctic Peninsula. The new hut is named SARGENTO CABRAL and is located at 63° 50' S, 58° 21' W.

"El Mundo" (Buenos Aires) says that Senor Arturo Illio, President of

the Argentine Republic, will visit the Antarctic in February "to re-affirm there Argentine sovereignty".

Bases to be occupied in the 1964-65 season are: Teniente Matienzo, Orcadas del Sur, Decepcion, Almirante Brown, Esperanza and General Belgrano. Ships participating in the relief operations are, according to "Dill Reports the News", General San Martin, Bahia Aguirre, the tanker Punta Medanos, and the oceanic research ships Comandante General Zapiola and Capitan Canapa.

A Buenos Aires report says: The Argentine Air Force successfully launched its third Gamma-Centaur rocket in Antarctica on February 9.

### CALLING MOSCOW

On February 16 Scott Base rang Moscow. Dr. Igor Zotikov, a Russian exchange scientist wintering at the American McMurdo Station, spoke from Scott Base to his wife and family in Moscow, twelve thousand miles away. The actual path of the call was several thousand miles longer.

Dr. Zotikov's call was scheduled for 1.30 p.m., but he came the two miles from McMurdo to Scott at 10 a.m. to make sure he would be on time.

The call went from Scott Base to Wellington, then by toll circuit to the International Telephone Exchange at Auckland. Compac cable took it on to Honolulu and Vancouver, microwave took it to Montreal, submarine cable to Oban in Scotland, the United Kingdom toll system to London, and finally European telephone connections to Russia.

The call was "worked" by Scott Base operator Ted Gawn, who says it took about three minutes to reach Russia from the time the number was asked for at New Zealand's International Telephone Exchange. The circuit, he says, was "very good quality", and Dr Zotikov with great smiles explained in his limited English how happy his wife and family were to hear from him.

# THE BRITISH ANTARCTIC SURVEY REPORTS PROGRESS

Contrary to expectations this 1964-1965 summer has been a good ice season for the relief of the bases maintained by the British Antarctic Survey.

An unexpected breakout of foot ice and pack allowed the "John Biscoe" to reach Adelaide Island on December 19. Never before has a ship succeeded in relieving Marguerite Bay bases five years in succession. At this time Stonington Island was inaccessible but there is no doubt that this base will be relieved in due course.

Before going to Marguerite Bay the "John Biscoe" started work on hydrographic survey in the South Orkney Islands. A fault in the Hi-fix surveying equipment allowed her to go south when the ice broke up. Since she returned she has completed 890 miles of soundings and the new equipment has been reported a great success. In the course of this work much valuable biological work was done.

"Shackleton" and "Protector" accomplished two ship seismic soundings in the Bransfield Strait area, since when the "Shackleton" has carried on alone.

## OTTER OUT

What promised to be a rewarding season's field work in the Marguerite Bay area was checked by an accident to one of the Otters. Landing on Adelaide Island in poor visibility resulted in a crash. Fortunately no one was hurt but the aircraft was a write-off. The efforts of the remaining plane had therefore to be confined to recovering field parties.

Despite this setback much valuable work was done on the east coast and in the George VI Sound area. Without aircraft support next season supplies already delivered should permit useful work in the latter region.

The "Kista Dan" had a completely ice-free passage to Halley Bay and the relief of this base was accomplished in good time.

## STONINGTON ISLAND RELIEF?

The latest news is that on February 18 the "John Biscoe" was at the Argentine Islands ready to return to Marguerite Bay. Reports indicate that she will have an ice-free passage and that the way is now open to Stonington Island.

## SOUTH FROM HALLEY BAY

A British research team has established a base in unexplored territory 800 miles from the South Pole.

The position of the new station, which will be manned in summer, is 77° 57' S., 24° 48' W.

The team is headed by Dr. G. Bowra. Its main objective will be to measure the drift of electron clouds over the Antarctic from the station they set up 170 miles south of Halley Bay after a hazardous 13-day journey over the icefield in two snow tractors towing sledges.

## VALUABLE SITE

The area the team is investigating is of particular scientific interest because it is at a very high geographic latitude but at a low magnetic latitude.

Sir Vivian Fuchs said the journey into entirely new territory had not only made possible a valuable contribution to ionospheric studies, but had paved the way for a future journey to link up the British mapping programme with work done farther south by the 1955-57 Transantarctic Expedition.

## THE B.A.S. BASES

The following notes on British Antarctic Survey bases will help readers

to appreciate more fully the references to them in our quarterly B.A.S. reports. All except Halley Bay are in the Antarctic Peninsula (formerly Graham Land) area. For locations and number of personnel see "Antarctic," Dec. 1964, p. 546.

**Adelaide Island:** Built on one of the few rock outcrops from the ice-shelf on the south coast of Adelaide Island, this is one of the southernmost British bases in the Antarctic Peninsula area.

**Argentine Islands:** The present station built in 1954 replaced the earlier station erected in 1947 on the site of the British Graham Land Expedition in 1934-37. Both sites are on a group of small islands.

**Deception Island:** Occupied since February 1944, the site is a natural harbour of volcanic origin which affords shelter and water for ships and is much used in summer.

**Halley Bay:** Situated on the blunt ice-shelf fringing the Caird Coast, Coats Land, east of the Weddell Sea. Buildings have to be replaced as they sink below the surface. Access has been found to the continental interior. Easily the most southerly British base.

**Signy Island:** Not much south of 60°, this base is on one of the S. Orkney Islands. It is the Survey's main biological centre and a large, well-equipped laboratory was built in 1963-64.

**Stonington Island:** The most southerly of the Antarctic Peninsula stations. There is no scientific programme here. The base is used for logistic support of field parties working in the Marguerite Bay area. Established in 1946, it was closed in 1950 and re-occupied in 1958. A new hut was built in 1961.

## IN NEXT ISSUE

### POLAR HOVERCRAFT COMING? A DIFFERENT WAY OF LIFE

(A F.I.D.S. man visits Ross Sea bases.)

## CHILEAN RELIEFS

Members of the three branches of the armed forces forming part of the 19th Chilean Antarctic Expedition left Valparaiso on December 12 to relieve the men who have wintered at the Chilean bases. In his welcome, President Frei is reported in the Chilean press as saying: "Chile maintains and will maintain her historical, geographical and legal rights in the Antarctic." The Commander of the Task Force is Captain Augusto G. Stahr.

### SUMMER TASKS

A new radio station is to be erected at Aguirre Cerda to provide space for equipment providing a radio link with McMurdo and the installation of directional and rhombic aerials.

A vulcanological station is to be installed and operated at Pedro Aguirre Cerda. Ornithological studies will be undertaken at Nelson Island and geological research in the South Shetlands.

During the summer a labour force of 47 men will effect repairs and extensions to existing bases.

Equipment is to be installed at O'Higgins and Arturo Prat bases for the ecological study of invertebrates in different Antarctic and sub-Antarctic land environments. A heliport is to be constructed at Arturo Prat.

Ships participating in the relief operation were the transport "Piloto Pardo", the patrol-ship "Lientur" and the frigate "Covadonga". The "Piloto Pardo" carries two Type C Bell helicopters.

Commanders of the station and personnel for 1965 will be:

**Arturo Prat:** Capitan de Corbeta Ramon Capetillo and 8 men.

**Bernado O'Higgins:** Capitan Arnaldo O. Acevedo and 8 men.

**Pedro Aguirre Cerda:** Comandante de Escuadra don Mario J. Barrera and 9 men.

The fourth base, Gonzalez Videla on the Danco Coast, is temporarily to be maintained as a summer base only.

## INSPECTION

On January 30 the Chilean Minister of Defence, don Juan de Dios Carmona, left Chile on the frigate "Covadonga" for an inspection visit to Chilean Antarctic bases. He was due at Arturo Prat (on Greenwich Island in the South Shetland group) on February 3, Bernardo O'Higgins on the 4th and after traversing Gerlache Strait as far as Guesalaga Island was to visit Pedro Aguirre (on Deception Island) on the 5th.

He was accompanied by the Commanders in Chief of the Army, Navy and Air Force, the Director of the Chilean Antarctic Institute, the Rector of Concepcion University and the Dean of the Faculty of Sciences and Mathematics of the University of Chile.

The previous night two Grumman aircraft of the Quintero air base were readied at Chabunco airfield, Punta Arenas, to provide an escort for the Minister and his party. A further two aircraft were held in readiness in case of emergency.

## RETURN

Members of the 18th Expedition were welcomed home when they arrived at Punta Arenas in January on the frigate "Covadonga". They were then flown to Santiago. The returning Commander of the Aguirre Cerda base, don Andrés Pacheco, said that during the year no serious problems had arisen.

The 4th meeting of the Antarctic Powers under the Antarctic Treaty is to be held in Chile next year.

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Mr. Jacobs investigated radio signals generated naturally in the earth's magnetic field, and maintained the Vostok link of a continental network of cosmic ray detectors established last year by the National Bureau of Standards. Both of these projects will continue with Soviet operators.

The Russians will receive duplicates of data from all the American projects here, which constitute more than one-third of Vostok's current research programme.

## AMERICANS AND RUSSIANS CO-OPERATE

A despatch to the American press from Vostok on January 11 states:

Soviet scientists are carrying out experiments set up by United States scientists in a spirit of warm co-operation at the coldest spot on earth. American physicists recently installed geophysical instruments at Vostok, where a temperature of 127° below zero was recorded several years ago.

Soviet scientists are operating the equipment at a breath-robbing altitude of two miles and a quarter. Vostok is situated high on the polar plateau, about 750 miles from the South Pole. It is at the core of the earth's magnetic field, a key position for studies of geomagnetism and related mysteries of the polar skies.

The National Science Foundation provided grants to the University of Alaska and the National Bureau of Standards to conduct several projects here, and made arrangements for Soviet assistance. The National Science Foundation, an independent agency of the United States Government, finances and administers the United States Antarctic research programme.

## AMERICAN RESEARCH

Dr. V. P. Hessler, University of Alaska geophysicist, and Mr. J. Whitcomb, National Bureau of Standards engineer, flew here in United States Navy Hercules aircraft. Dr. Hessler established systems for measuring pulsations of the earth's magnetic field and associated electric currents on the surface. Mr. Whitcomb installed devices to monitor the fluctuating charges in the ionosphere.

## GENESIS

The Vostok arrangement grew out of two projects run in 1964 by Mr. J. Jacobs, University of Alaska, radio physicist, who was the American participant in the annual exchange of scientists between American and Russian Antarctic stations. He was the first American to work at Vostok.

# Japan Prepares to Re-occupy Showa Station

The Japanese Ministry of Education is stepping up its preparations for the planned re-opening in the 1965-66 summer of Showa Base, built in January 1957, and occupied with one break of a year until 1961, when the sixth Japanese Antarctic Research Expedition cocooned the base and left for home.

Showa is on Ongul Island in 69° S. 39° 35' E., off the Prince Harald Coast in Dronning (Queen) Maud Land.

Two Japanese scientists, biologist Dr. Tadsuro Matsuda and geologist Dr. Koshiro Kazaki, arrived in Fremantle on December 29 to board the Soviet vessel "Estonia". They were expected to visit Mirny for about a month and to spend about 48 hours at the Japanese Showa Base to check buildings, scientific equipment and other facilities. Showa is some 300 miles from Mirny.

The two men returned to Japan on February 6, much earlier than expected. They had only 10 days in Antarctica but visited Showa Station on January 14 with the assistance of the Soviet team. They reported on their return to Japan that the buildings and equipment, left behind on February 9, 1962, are in good condition. The ten panel-huts are ready for occupation. Only a canvas tent used as a store-house has been damaged. Mr. Kazaki said that it was hoped to expand the base to house about 30 men within a few years. The wintering team for 1966 is expected to number 18, and there will probably be about 22 in the summer party.

## ICEBREAKER

When the base is re-opened, the team of scientists and support personnel will have the use of the new icebreaker which is being built at Kawasaki near Tokyo and which is expected to be launched about mid-March. The poor condition of the icebreaker previously used was one of the reasons why the base had to be closed down. The crew have been in

training in the pack ice of the Okhotsk Sea.

Further preparations include the testing during the present (northern) winter of a new over-snow vehicle and a helicopter under cold conditions in the northern island, Hokkaido. It is anticipated that the "snow car" will be used for a long inland journey, possibly from Showa to the South Pole.

## POLAR INSTITUTE

A new Japanese research organisation, we are informed, is in process of formation, the Japanese Polar Institute, a private body. We hope to publish further details in our next issue.

## RESEARCH SHIP

After a month's work in the Antarctic the Japanese fishing research vessel "Umitaka Maru I" called at Lyttelton on December 27 to refuel and take on supplies. With 42 post-graduate students from the Tokyo University of Fisheries and 11 research workers on board, the vessel left for a further month in the Antarctic on January 3.

"Umitaka Maru I" is commanded by Captain K. Ozawa and has 13 officers and a crew of 26. Captain Ozawa is himself a graduate of the Tokyo University of Fisheries.

Those aboard are engaged in oceanographic and biological investigations mainly along the edge of the ice pack to the south of Australia and New Zealand.

## SCIENTIFIC PROGRAMME

Their chief aim is to gain information about the shrimp-like crustacea which are the staple food of marine life in the Antarctic.

In addition, the university men on board are studying geophysical aspects of the area they traverse and are measuring geomagnetism and gravity while under way. They are also mapping the ocean bottom by the use of an echo-sounder and are taking core samples of the sea bed at depths of up to 3,000 metres.

Daily water samples, pressures and temperatures are also being recorded from graded depths down to 3,000 metres.

Work being done on behalf of the International Hydrographic Bureau in Monaco includes a survey of undersea mountains south of Macquarie Island.

### RESEARCH AIDS

The ship carries fishing and plankton nets together with equipment for trawling at depths of 2000ft, and is equipped with the most modern devices for aiding its scientific staff. Equipment includes underwater cameras (made in the United States) complete with flashlights, and a photographic meter for measuring the intensity of sunlight to depths of about 100 metres.

Some direct benefits accrue to New Zealand from the vessel's voyage. When in Antarctic waters it passes daily weather reports to the Campbell Island weather station for transmission to New Zealand.

The reason officially given for the voyage is "practical training in pelagic (ocean) fishing and research in the Antarctic regions and ocean navigation."

The *Umitaka Maru* is a stern trawler of 1450 tons with a speed of 13 knots. She is fully equipped for all types of fishing research, and is owned and maintained by the Japanese Government.

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### OLD WHALE MARKS

Two fin whales captured in the 1963-4 season had marks fired 29 years before, in 1934-5. Both whales had been marked in 54°S., 40°W. One mark was recovered in 51°S., 32°W., the other in 56°S., 37°W.

## THE SUB-ANTARCTIC

### CROZET ISLAND (France)

Rain, snow and violent winds characterised the months of October and November and hindered outside work at the Crozet Island station. However, the cable-railway was ready for operation when unloading began with the arrival of "Gallieni" on December 12—in good weather. Three hundred tons of supplies and equipment were discharged without incident by the 15th, when "Gallieni" left for Kerguelen. She carried the members of this first Crozet Island expedition who, at the end of a hard assignment, watched the black cliffs of these inhospitable but now strangely familiar shores sink below the horizon with joy not untouched with sadness.

### KERGUELEN ISLANDS (France)

In spite of unfavourable weather conditions, in spite of violent winds and squalls, the works programme was not interrupted—annexe buildings completed, regular radio operation, preparation of the framework and anchorages for the future 72 m. high ionosphere pylon, arrangements for unloading.

A fire alarm on November 2 from the geology lab. . . . fortunately there was no serious damage done. The other scientific laboratories functioned normally.

Oceanographic trawls in Morbihan Bay.

Several reconnaissance trips, one of which, a climb of the right flank of Ross Crater to 1,200 m., was restricted by fog.

The "Gallieni" anchored on December 18-19 at Port Christmas and a team which landed for several days to carry out geological research under the direction of J. Nougier arrived at Port aux Francais on the 19th.

Unloading operations were delayed somewhat by bad weather and did not begin till the 21st. 1,350 tons were off-loaded up till the 27th, when "Gallieni" departed for Nouvelle Amsterdam, via Port Christmas.

## CAMPBELL ISLAND (New Zealand)

### A RUSSIAN VISIT

January has been a very exciting month for Campbell Island, with the calling of an unexpected visitor in the form of the Russian oceanographic marine research vessel "Genevny" having her home port at Odessa. This vessel anchored in Perseverance Harbour on January 15 for her engineers to prepare her equipment for biological and oceanographic research after leaving Campbell Island.

As far as can be ascertained it is the first Russian ship ever to visit Campbell Island and on board were chief scientist Dr. Gennady Solyanik and his wife Svetlana.

The coming ashore of Mrs. Solyanik marks another milestone in history, she being the fourth lady ever to step ashore on Campbell Island.

At 3.30 p.m. the same afternoon the American picket ship U.S.S. "Mills" en route for Dunedin also anchored in the harbour, and exchange visits were made between the ships.

The U.S.S. "Mills" invited De St. Croix and Ingram to judge the beard-growing contest as they were the oldest inhabitants on the island and both supporting very long beards.

Souvenirs were exchanged between the Russians and Campbell Island staff with the Russians presenting the island with two Sperm Whale teeth beautifully polished and engraved with a picture of Perseverance Harbour.

In return for the hospitality bestowed on the expedition members, Gordon Surrey, the chef of the island, prepared a sumptuous and typical New Zealand meal, with numerous wines brought forward for the occasion.

The "Genevny" departed Campbell Island on Saturday the 16th at 12.45 p.m. for the Ross Sea and Peter I Island. As she left there was much horn blowing and a really magnificent distress signal was sent into the air.

Temperatures for January were very high with some days reaching 69°. The members took full advantage of this and a sailing regatta was held on the harbour; also a lot of swimming was done which does not happen very often on Campbell Island and a few lads suffered sun-burned backs.

On January 30, the flag on the station was flown at half mast in remembrance of Sir Winston Churchill, and at 7.30 p.m. a short memorial service was held with the leader Colin Clark giving a resumé of Sir Winston Churchill's career. Peter Ingram played a tape recording of a famous Churchill speech.

On February 18 the U.S.S. "Mills" called in at Campbell Island on her last voyage south to Ocean station and discharged fresh food and mechanical equipment to last the party over the winter months to come. She will call again at the island en route to Dunedin to uplift St. Croix and Ingram who have finished their 18-month tour.

## MACQUARIE ISLAND (Australia)

M.V. "Nella Dan" left Melbourne on December 2 with the relief expedition for Macquarie Island. The new party of 18 men to relieve the 1964 party has as its officer-in-charge C. Bruce Ellwood.

Comprehensive long-term scientific studies will continue, as in past years, during 1965, in meteorology, upper atmosphere physics, zoology, geomagnetism and seismology. In addition, for the first time since 1951, a full-time botanist, John Jenkin, will spend a year on the island, where he will study the pattern and seasonal growth of the plant communities in relation to microclimatic factors. He will also make a quantitative assessment of the effect on the vegetation of grazing rabbits introduced by sealers in the 19th century.

While the ship was at Macquarie Island, Professor J. Bruce Falls, a visiting biologist from the University of Toronto, made sound recordings

of the calls of penguins, albatrosses and seals. Few such recordings have previously been attempted in the sub-Antarctic. Other scientists who pursued short studies during the changeover included Dr. R. Carrick, of the CSIRO Division of Wildlife Research, two botanists, two oceanographers, an ozone physicist, a geographer and four women scientists. All these activities are additional to the long-term scientific research which is continuously carried out at Macquarie Island.

Help during the relief operations was given by two Army Cadets, two Queen's Scouts and two Sea Scouts who accompanied the ship for the return voyage.

Under the leadership of Dr. Phillip Law, the changeover operations took six days, during which 650 tons of cargo were unloaded and three new buildings were erected—a meteorological office, a surgery and a refrigeration room.

Landings were made at Bauer Bay, Sandy Bay and Green Gorge to put ashore stores and provisions for field parties. The first two were made by Army DUKWs, and the third by a rubber pontoon. The hazardous pontoon landing was made by 15 men, amongst rock and kelp in heavy surf, but although four men were thrown into the icy sea, all struggled out again and the stores were safely landed. Stores for the main station were unloaded by DUKWs from the ship half a mile offshore.

During six days at the island teams of scientists, who are making the round trip from Melbourne, worked on Royal Penguin studies, botanical investigations, geomorphological investigations, the results of past glaciations, the recording of sounds made by seals, penguins and sea birds, the ozone content of the atmosphere, and wave movements around the coast.

Four women, all biologists, also made the round trip. Two of them, Mrs. C. Carrick and Mrs. B. Falls, were with their scientist husbands. The other two were Miss J. E.

Thomas of the Antarctic Division and Miss S. Ingham of the C.S.I.R.O.

"Nella Dan" returned to Melbourne on December 16.

## JANUARY NEWS

Highest temperature 52.8°F., lowest 34.6°F.,; rain on 22 days and the maximum fall for one day was 23 points. The relative humidity was 85 per cent.; there was sunshine for 88.7 hours, and the highest wind speed was 54 knots.

The "Meteorological Office" now has a rock garden and a sign announcing that information and forecasts can be obtained there. The latter has yet to be proved as a correct statement due to the constant changes in our weather.

Ormay and Jenkins have made numerous intrepid trips hunting and are usually successful in bagging enough for a meal for all hands. The rabbits also help in the cause of science as Simpson is doing some research in the stomach contents of the animals. He and Purchase have been involved with studies of the skua gull lately and both bear many scratches and bite marks to show the sharpness of talons and beaks. Bryden and MacKenzie have been dissecting seal carcasses and after tests are completed the choicest cuts are used for the skua trap. The seal tank is now almost ready for use and within a couple of weeks it should have its first occupants.

## MARION ISLAND

(S. Africa)

A biological expedition was scheduled to work on Marion Island from December 1964, travelling on the South African research vessel "RSA" on her voyage south to SANAE. The team was to be relieved by the "RSA" later on her usual relief and resupply voyage.

Activities planned include collecting of fauna and flora, study of the influence of animals on vegetation, etiology of birds and seals.

# British South Georgia Expedition Attains All Objectives

As mentioned in a stop-press note in our last issue, the ten-man Combined British Services expedition in South Georgia succeeded in covering "in all details" the route followed by Shackleton, Worsley and Crean in their historic crossing of the island nearly 50 years ago.

Now we can report that the expedition has successfully completed its assignment. The expedition was sponsored by the Navy Department of the U.K. Ministry of Defence.

The expedition, led by Lt.-Cdr. Malcolm Burley, R.N., and consisting of four men from the Royal Navy, three from the Army and three from the Royal Air Force, was landed in South Georgia on November 15 to spend four months undertaking a wide range of scientific and surveying tasks in almost unknown regions.

The exact track, which has hitherto been the subject of dispute, taken by the famous explorer has been established beyond doubt. Shackleton crossed from the south to the north coast of the island to obtain help from the whaling stations there following their incredible open boat voyage from Elephant Island when their ship, the "Endurance", was crushed in the ice in 1916.

After being put ashore by H.M.S. "Protector", R.N. ice patrol ship, the expedition retraced Shackleton's route from King Haakon Bay over the interior mountains to the now ghost whaling station of Stromness on the opposite coast. The geographical descriptions given by Shackleton were found remarkably accurate, but so precipitous were the ranges encountered that all of the members of the party were compelled to take part in the rope lowering of their equipment, including sledges, down the steep slopes.

South Georgia, states the report from the island, lives up to its reputation as far as weather is concerned.

Blizzards have nearly buried the expedition's camp and stores on occasions, while fierce gales have tested equipment to the full. Much of the travelling has been in "white out" conditions by compass.

Early in December the expedition was at Leith, preparing to move off into the Allardyce range, where its main mountaineering task, including assaults on two unclimbed peaks of nearly ten thousand feet, was to be undertaken.

## UNCLIMBED PEAKS SCALED

Mount Paget in the Allardyce Range, the highest mountain in South Georgia, whose 9,625 ft. peak had defeated the efforts of at least three previous expeditions, was the first objective.

The assault was mounted by Lieutenant Simon Down, Royal Marines (24), Sergeant Thomas Lynch, Parachute Regiment (26), and Senior Aircraftman John Chester, R.A.F. (25).

"Whiteout" conditions were common in the early stages and ten days passed at one stage with visibility at less than a hundred yards. Christmas Day was spent camped in a snow-storm on an exposed glacier and it was on the following day that the Mount Paget team set off carrying twelve days' rations.

The three men reached the summit on December 30. They followed the same route as that of the 1960 expedition from H.M.S. "Protector" which succeeded in climbing the 9,565 ft. high west peak of the mountain.

Lieutenant-Commander Malcolm Burley, R.N. (36), leader of the present expedition, was one of the three men who made the 1960 climb.

### MOUNT SUGARTOP

In the meantime three other members of the expedition successfully reached the summit of 7,623 ft. high Mount Sugartop, another unscaled peak in the same range. They were Squadron Leader Anthony Back, R.A.F. (33), deputy leader of the expedition, Sergeant Terence Thompson, Royal Marines (27), and Captain John Peacock, R.E.M.E. (32). After being stormbound for several days, an initial reconnaissance of the mountain matured into a full-scale climb. The peak was reached on January 4.

The remainder of the expedition — Lt. Cdr. Burley, Control Artificer P. Langdon, R.N., Sgt. H. Hutt, R.A.F., and Capt. P. Fagan, R.E., stood by as a reserve climbing and rescue team.

### RETURN DELAYED

Frequent blizzards and gales, the latter assessed out at sea by a whale-catcher as Force 11 — has delayed the return of the expedition to Gryt-viken. An isolated tent occupied by two members of the party collapsed during the worst blizzard. For fifteen hours they sheltered in a tent made from their sleeping-bags, but both escaped with minor frost-bite.

The expedition, which left Britain in October, has completed the first crossing of the Allardyce Range. It has also crossed the island on three occasions. During the last week in January the members, all in good health and spirits, set out for survey work in the rarely visited Royal Bay area on the northern coast of the island.

The expedition is scheduled to re-embark in H.M.S. "Protector" in March and to arrive back in Britain in May.

## BIG BEN CONQUERED

**"Summit Mawson Peak Big Ben reached on January 25 by five men. All main aims achieved. Whole expedition fit and headed for Australia."**

This jubilant radio message from Warwick Deacock to *The Australian* broke the news of the successful outcome of the South Indian Ocean Expedition to Heard Island.

The ascent of previously unclimbed Big Ben was the most spectacular aim of the 10-man team of adventurers, which included three New Zealanders, Colin Putt, Phillip Temple and John Crick. Other main aims were:

To measure the temperature inside the active steam vents of the summit cone and collect sublimates and other material as an indication of the present state of volcanic activity.

To study and collect samples of exposed rocks. None has previously been collected above 4,000 ft. on Heard Island.

To measure the temperature in crevasses to determine if the ice at

high altitudes is temperate, like that of the Alps, or polar, like that of Antarctica.

### EARLY TROUBLE

The "Patanela", a 63 ft. cray-fishing schooner, left Sydney on November 5. Twenty-four hours out of Sydney she ran into a southerly and hove to for 36 hours.

During the storm, Major Tilman, the skipper, was flattened by a giant wave. Another casualty was Russel Pardoe, one of the three doctors in the expedition, who spiked his hand reefing in the main sail.

50 m.p.h. gusts lashed the "Patanela" at the height of the storm. The schooner drifted 50 miles out to sea but was undamaged.

The "Patanela" was off Wilson's Promontory late on November 9 on its first leg to Albany, in Western Australia.

The schooner reached Albany 14 days after leaving Sydney and a weekend was spent making practice landings from an 18 ft. raft equipped with an 18 h.p. outboard motor. On the 27th, after waiting for fierce westerlies off the West Australian coast to abate, the adventurers pushed south into the roaring forties.

No further report was received by *The Australian* until December 29, when "Patanela" was 600 miles from Kerguelen Island, and 4,722 miles from Sydney.

### GALES STRIKE

On January 21 a message was received saying that the schooner had been swept 100 miles off course in a fierce gale. Bleak winds, sub-zero temperatures and 100 ft. waves battered the vessel, which fought her way back to reach Winston Glacier lagoon on Heard Island. Here a landing was made by the climbing party while "Patanela" headed for a more sheltered haven at Kerguelen.

### AT KERGUÉLEN

Three weeks were spent at Kerguelen, the first week at Port aux Français, the French base. During "Patanela's" stay high winds made anchorages uncertain and the vessel dragged anchor several times before she was forced ashore by a 65 m.p.h. wind. She was floated off under her own power. Dr. Pardoe used an aqualung to examine the hull but found it undamaged.

During the last fortnight at Kerguelen "Patanela" made "minor sorties" on the island with members of the French expedition.

### THE TRIUMPH

No details are yet to hand concerning the climb, so it is not known how many days the climbers waited on the volcanic plateau before the weather made the attempt on the summit of Mawson Peak possible. The slopes of Big Ben are seamed with crevasses. Temperatures at this time of year average 9° near the summit and 50 m.p.h. winds are common. The crest of Big Ben is a filled-in volcanic crater surrounded by peaks, of which Mawson Peak is the highest. The peaks are shrouded by blizzards.

### LATEST NEWS

(February 27)

The "Patanela's" crew expected to sight the West Australian coast by March 2. The vessel had been making 150 miles per day in front of the Roaring Forties.

### NO PLACE FOR GIRLS

Most New Zealand and Australian readers will have heard of Lee Quinn, the man who prefers to man his 45 ft. ketch "Neophyte" with women and go on tropical cruises.

After several such cruises Mr. Quinn thought it would be interesting to go south for a change. The venture was widely publicised in the Australian press as a voyage "to the Antarctic", but the call for an all-girl crew did not attract many applicants. Finally only one member of an earlier (tropical) all-girl crew accompanied Mr. Quinn when "Neophyte" set sail from Hobart on January 11. She was Barbara Sodd (28) of San Francisco.

Two experienced Frenchmen whom Quinn consulted, Paul-Emile Victor and Captain V. Pedersen of "Thala Dan", warned him of the danger he was running ("The weather might break up very quickly and then where are you?" said the Captain), but Quinn set sail, determined to have his ketch photographed beside an iceberg before he returned.

### ABOUT TURN

A fortnight later, on January 22, "Neophyte" limped into Hobart with sails tattered, rigging damaged and its bilge pump out of commission. The ketch's cabin was almost awash and sleeping gear was soaked.

Quinn told how gale-force winds had sent huge waves crashing over the ketch. About January 18, in 60 degrees one minute south, the first iceberg was sighted — by Barbara. Apparently no photograph was taken.

The weather deteriorated further and it was decided to turn back.

Mr. Quinn expects to be in Hobart about a week getting his yacht seaworthy. He then hopes to sail with an all-girl crew — to India.

## MEASURING DEPTH OF ICE BY RADAR

(A December report)

New Zealand is one of the three nations represented in a four-man field party testing a new technique of measuring ice thickness based on a radar probe.

This system will dispense with the present arduous seismic method, and it can be used from aircraft.

To make seismic measurements of ice, holes have to be drilled for explosives that are set off to give a shock wave, and recording instruments need to be connected up across the area being measured.

To check their equipment U.S. scientists joined for a while with a N.Z.A.R.P. project on the Ross Ice Shelf movements immediately south of Scott Base. The party are now 80 miles south at the Skelton Glacier and will be there for about a week. Using motor toboggans for transport they will work along the lower 40 miles of the glacier.

George Jiracek and James Nicholls, of the University of Wisconsin, United States, measured ice depths of more than a mile with the radar equipment in the Arctic only a few months ago, and in continuing their work in the Antarctic they expect the radar equipment to be more effective because of the colder temperatures.

John Green (United Kingdom), an administrator of the British Antarctic Survey, who has spent about 14 consecutive seasons on the Antarctic Peninsula, is with the party, as well as Ray Hoare, Victoria University of Wellington. This is Mr. Hoare's second summer season in the Antarctic. He has joined the party to guide them in working on ice and snow.

This method of measuring ice thickness by radar was stumbled upon when it was found that aircraft altimeters were giving false readings over ice. They give a reading calculated from the sea level beneath the ice.

As well as giving thicknesses, the

radar method yields valuable information on temperatures at varying depths, and the geological formations on which Antarctic ice masses rest.

After a week along the Skelton, Mr. Jiracek intends using the equipment in other parts of the Antarctic and eventually at the South Pole, where seismic measurements have been made by the leader of the South Pole traverse, Dr. Charles Bentley (University of Wisconsin), to whom Mr. Jiracek is a research assistant.

In making use of this radar ice depth measurement from an aircraft it will be possible for a plane to fly over an iced area and plot where the ice is thin enough for an icebreaker to cut a channel, or where it is thick enough to land an aircraft.

Equipment for the radar method of ice measurement has been built by the Scott Polar Research Institute and similar methods were experimented with in February by the Russians at Mirny.

Well-established seismic sounding methods were used by the Queen Maud Land traverse party to plot ice depths and sub-ice topography, but at the same time University of Wisconsin geophysicists were testing the new method of "looking" into these distances.

Dr. Bentley said that with this new method of radio sounding, contours of the ground beneath arctic or antarctic icecaps can be rapidly charted, and it may eventually give information about its geological characteristics, as well as about the qualities of the superimposed ice.

Former radioman with the second Byrd Antarctic Expedition, Amory H. ("Bud") Waite, now a member of the Institute for Exploratory Research of the U.S. Army Electronics Laboratories, developed the new technique and designed the equipment for its use during many years' work in both the Arctic and Antarctic, and results of this summer's tests of it indicate that radio soundings should be operational during next season and almost completely antedate seismic depth, gravity and geomagnetism measurements.

# THE WEDDELL SEAL POPULATION OF McMURDO SOUND

M. S. R. SMITH\*

[The following article is based, by permission of the Superintendent, Antarctic Division, D.S.I.R., on a recent report by Murray Smith, who has carried out an intensive study of the seal population of McMurdo Sound during the past four summers, and also wintered over at Scott Base during 1963.—Ed.]

The Weddell Seal is the one which most people who visit the McMurdo Region see. It is one of a group of four truly Antarctic Seals, namely:

1. Leopard Seal  
(Cape Crozier and infrequently at Cape Royds.)
2. Crabeater Seal  
(Found frequently in the pack ice.)
3. Ross Seal  
(This is the rarest of the group and is found in the pack ice.)
4. Weddell Seal  
(See later description.)

These seals along with the penguins and skuas are the most notable elements of the Antarctic fauna. The Weddell Seal belongs to the major grouping of seals, divided into three main subdivisions:

1. Eared Seals (Fur Seals): These are the seals which are found around the New Zealand coast, e.g., Kaikoura Peninsula.
2. Earless Seals: The Antarctic Seals.
3. Walruses: These are found in the Northern Hemisphere Arctic only.

The Weddell Seal is circumpolar in distribution and rarely moves far north of the pack ice belt. There are a few reports of Weddell Seals being sighted off the New Zealand coast: in all cases these were young animals. The seal pups in the McMurdo Sound area between approximately 15 October and 15 November and the main area is between Scott Base and Cape Royds. In odd years there are a few pups born in the pressure ridges off Scott Base.

## WHERE DO THE SEALS GO . . . ?

A programme of research has been undertaken by the University of Canterbury to study the seals in McMurdo Sound in the 1961-62 season and to date four summers' and one winter's work has been completed. Here is a resume of the results so far obtained.

During the winter period there is only a small overwintering population of seals in the Sound and these tend to congregate about the open tide cracks around Turtle Rock and the Dellbridge Islands. This population has been estimated to be approximately 250 seals. Then in spring (late September to early October) there is an influx of females moving into the pupping areas and this builds up the main population to about 1,000 seals. After the pupping period there is a gradual build-up of male and female seals in the area until early January when the peak of approximately 2,600 seals is reached. These seals move in a southerly direction ahead of the ice breakup and this can be seen by the gradual build-up of the seals in the pressure ridges off Scott Base.

The seals come into the pressure ridges and reach peak numbers about early February. They start to move out of the area in late February and the last seal recorded at the Base was 7 April. After the seals move out of McMurdo Sound most go north to the pack ice to spend the winter. This area is an easier place to live in than the Sound where there is thick ice from May till the break-up in the next summer.

What is very noticeable is that the seals lying on the ice are controlled by the prevailing weather conditions. Strong winds coupled with the other meteorological conditions restrict the

\* Zoology Department, University of Canterbury.

numbers of seals lying on the ice. Another point to notice is that the seals feed in the early hours of the morning and consequently very few seals are seen lying on the ice from 2000 hours until 0800 hours. They come out on the ice during the day to rest and digest their food, which consists of fish and squid or octopus.

### CONSERVATION

Now that the Antarctic is becoming more populated year by year it is becoming important to think seriously about conserving the Weddell Seal in our area. We must ensure that we do not affect the seal population by overkilling the stocks and by excessive human interference. This population of seals in the pressure ridges is rather unique because it is one of the most southerly occurrences of a mammal other than humans. (Approximately 800 miles from the South Pole.) These seals have been killed annually to feed the dogs which are still an integral part of our programme, but this kill must be rigidly controlled. Only males must be killed and definitely no females and this will ensure that the stocks of the Weddell Seal will not be diminished. The kill should be started about the first week in February and should not encroach into March. As far as it is possible it should be attempted to take only large males.

As New Zealand is a signatory to the Antarctic Treaty it is up to all at the Base (staff and visitors) to ensure that the Weddell Seal population in McMurdo Sound is conserved.

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lia on "Aurora" but was back on the relief voyage (to pick up Mawson and the few who had remained) a year later, again as biologist.

He became probably the best known figure in Australian medicine, and his death on December 27 was described by the President of the Australian Medical Association as "a very great loss to the profession".

## MORE VETERANS PASS

### SIR GEORGE SIMPSON

The meteorologist on Scott's last expedition, Sir George Clarke Simpson, died in England on January 4, aged 86. As Dr. G. C. Simpson he spent the 13 months from January 1911 till February 1912 at the famous Cape Evans hut where he was generally known as "Sunny Jim".

He was recognised as a dedicated scientist. Cherry-Gerrard called him "obviously a first-class scientist, devoted to his work". The importance of this work and the fact that its nature demanded his constant personal attention made it inevitable that his part in the expedition was not a greatly publicised one. He was recalled before the second winter by the Indian Government for whom he had been working. But he played an extremely worthy part in the expedition's operations and was universally respected for his able and conscientious work as well as for the personal qualities which earned him his nickname.

After the expedition he became recognised as a world figure in meteorology. "Master of his craft" in Scott's time—and Scott's words—he became Director of the British Meteorological Office from 1920 to 1938 and President of the Royal Meteorological Society from 1940 to 1942. His name is commemorated in the Simpson Glacier Tongue, N. Victoria Land, and Simpson Head on the east coast of the Antarctic Peninsula.

### DR. J. G. HUNTER

As a young man of 23 John George Hunter was the indefatigable biologist of Mawson's main base party in 1911-14. He was a member of the Supporting Party which after the winter accompanied the Southern (Magnetic Pole) Party for the first 67 miles of their long journey, from November 6 till November 22, 1912, and arrived back at Cape Denison on November 27. He returned to Austra-

# THE READER WRITES

## Sidelights of Antarctic Research

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

### SOUTH POLE FLAGS

Sir,—

It was my good fortune to spend several days at the Amundsen-Scott South Pole Station on my second Antarctic trip. As a featherbedded modern Antarctic man, I felt that my half-mile walk to the site of the Pole was in the nature of an apologetic pilgrimage, and I hope that the ghosts of the pioneers were able to sense my feelings of awe and admiration and withhold their scorn. The occasion was, however, tempered with my sadness when I discovered that the two flags flying bravely at the bottom of the world were not the national flags of Amundsen and Scott, but the ubiquitous Stars and Stripes and the totally incongruous emblem of the State of Idaho. I yield to no-one in my admiration of American Antarctic men and their efforts. Will they likewise express their respect for those who went before them by the erection and maintenance of two flags, a simple and meaningful tribute to those who had so much more to fight than their modern counterparts? Truly a worthwhile crusade for the Antarctic Society!

CLAUDE B. TAYLOR

### HALLETT — AND ICEBREAKERS

Sir,—

After fifteen years with the British Antarctic Survey I recently had the pleasure of a visit to McMurdo Sound during which I spent three weeks at Scott Base. Like all Antarctic enthusiasts I find it difficult to mind my own business and therefore have no hesitation in joining

with Mr. Alack to urge New Zealand to maintain Hallett Station. For one thing it seems a pity to give up continuous observations in meteorology and upper air physics at this useful location. For another, there is a large chunk of Victoria Land lying behind Hallett where there must surely be much detailed geology, geophysics and glaciology to do.

I know the area is within aircraft range of McMurdo but it may prove more efficient to support field work in this area by land based helicopter or light aircraft (or even hovercraft). Above all, it would be good to see New Zealanders developing in isolation their own concept of Antarctic living. Such people are self reliant and cheerful and there are many experienced snow and ice travellers amongst those who take to the mountains back home. Apropos of warfare in the Western Desert it was said that the "British" quickly learned to come to terms with a hostile environment and developed habits of living in and with the country and not against it. In this respect New Zealand troops were pre-eminent. Look how many popped up in the "cloak and dagger" units.

The suggestion that New Zealand needs an icebreaker to maintain Hallett or for any other purpose is, however, unrealistic. At a guess, to restore the science building and services at Hallett would cost around £30,000. Recurrent expenditure may come to £60,000 a year. A small icebreaker would cost at least three million pounds to build and about £200,000 a year to run and *it would have insufficient cargo space to re-supply a base.*

I know nothing about ice conditions around Hallett but I imagine the fast ice breaks out nearly every year. If so, why worry about an icebreaker? I hear that ships are more concerned with bergs in the anchorage interfering with unloading. In that case, why not get there before

the fast ice breaks out and re-supply by tractor—the fast light variety, towing wooden cargo sledges. We did this at Stonington in 1960–61 and discharged the ship in five days over seven miles of fast ice using two Bombardier Muskegs (Model M6), each towing two “Maudheim” cargo sledges (5,000lb. on the sledges and 1600lb. on the tractors).

No, an icebreaker is not the “Open Sesame” to Antarctica that many people think. To coastlines heavily

infested with pack ice all summer—yes. If you really need to break fast ice—yes. In many areas ice strengthened cargo ships such as the “Dan” class are not only cheaper to run but they get through with all the necessary cargo.

Maybe the day is not too far away when hovercraft in Antarctica will put the icebreaker out of business.

JOHN R. GREEN

London, February 22, 1965.

## BOOKSHELF

### SUMMING UP WHAT WE KNOW ABOUT THE ANTARCTIC

An important book on Antarctic research is not often published. When two such books appear within the space of two or three months it is a notable event. The two volumes reviewed below are both works of outstanding importance.

Fortunately, while somewhat similar in general design—a series of articles by acknowledged experts on the major scientific disciplines and logistic problems associated with Antarctic exploration and research—the two books are complementary in that the one concentrates on British work in the Antarctic Peninsula area and the 21 contributors are British authorities in their respective fields; while the other deals primarily with the Ross Sea area and the authors (again 21 of them) are in the main New Zealanders or Americans.

Both books deal comprehensively with such topics as logistics (Fuchs: Law) and the main scientific disciplines e.g. biology (Bonner, Laws, Fraser, Marshall, Stonehouse, Greene: Dell, Stonehouse, Llano, Gressitt), geology (Adie, Linton: Bentley, Warren) and glaciology (Robin, Adie, Heap: Swithinbank, Zumberge, Gow, Heap). Two authors have the honour of contributing to both volumes, Dr. Bernard Stonehouse and Dr. J. A. Heap.

Empases differ, naturally. “Antarctic Research” gives greater attention, for example, to human physiology and landscape evolution, while “Antarctica” has more to say about national interests and the oases in the ice, and deals more fully with geomagnetism.

It remains to add that “Antarctic Research” is a somewhat larger and more ornate volume than “Antarctica”: and costs twice as much.

**ANTARCTIC RESEARCH: A Review of British Scientific Achievement in Antarctica.** Edited by Sir Raymond Priestley, Raymond J. Adie and G. de Q. Robin. With foreword by H.R.H. The Duke of Edinburgh. Butterworths, London. 360 pages, illustrations (37 in colour), maps and diagrams, 2 maps in folder. N.Z. price £11 18s. 6d.

This handsome volume is a much more readable book for the ordinary man who is interested in the Antarctic than its rather austere title would suggest. The coverage is so wide that it is in effect an Antarctic encyclopaedia. The illustrations are so numerous and so truly “illustrative”, the maps and diagrams so clear and helpful, and the 37 magnificent colour plates so irresistible, that the layman will find himself

interestedly reading about conjugate points and glacial sculpture and hydrographic surveys before he realises that perhaps he is somewhat out of his depth. On the other hand, the status of the contributors will assure the specialist that here is a summing up of Antarctic research in his own discipline which he cannot afford to miss.

As the sub-title suggests, the emphasis throughout is largely on the results of British activities in the Antarctic Peninsula (Graham Land), but, inevitably, there is considerable reference to Antarctica as a whole. In Robin and Adie's 18 page article on "The Ice Cover", for example, reference is made to the Dry Valleys of Victoria Land and such other "oases" as the Bunge Hills; there is a first rate summary of the methods used to measure the thickness of the ice with sample records of seismic soundings; and an illuminating map of Antarctica in colour shows the routes of recent traverses and the results obtained. Mr. N. B. Marshall's short article on "Fish" (the book's chapter titles are admirably succinct) makes considerable reference to Antarctic fishes in general and a diagram shows the distribution of fish types throughout Antarctic waters.

The diagrams are, in fact, a very notable and commendable feature of a book for which it is difficult to find anything but praise. Two sections of particular human interest are Sir Vivian Fuch's short (12 pages) but comprehensive chapter on "Polar Travel" today, and Dr. O. G. Edholm's summary of the effects on man of the "environmental stresses" to which men living in the Antarctic are exposed.

New Zealanders will read with pleasure the Duke of Edinburgh's tribute to our own Scott Base in his Foreword: "Today New Zealand continues the tradition of exploration in east Antarctica. Their base—universally acknowledged to be a model of what a polar headquarters should be—is situated within a mile or two of Scott's first Antarctic Headquarters established 60 years ago."

**ANTARCTICA: A New Zealand Antarctic Society Survey.** Edited by Trevor Hatherton. 512 pages, ill, diagrams, charts and maps. Methuen and Co. Ltd., London; A. H. and A. W. Reed, New Zealand. N.Z. price £5 5s. 0d.

(To be on sale shortly.)

This eagerly awaited successor to the Society's "The Antarctic Today" of 1952, has been worth waiting for. Here is a masterly summary of our present-day knowledge of Antarctica, focussing attention on the Pacific Quadrant, just as the English volume "Antarctic Research" does on the Antarctic Peninsula area, without loving sight of the whole of Antarctica.

This volume is more purely scientific in interest than "The Antarctic Today" with its historical and descriptive chapters, and more of its contributing authors are non-New Zealanders (10 compared with 5). But all are acknowledged outstanding authorities in their spheres as the names of Charles Swithinbank, George Llano and J. Linsley Gressitt attest.

Dr. Hatherton has held the editorial reins firmly without being dictatorial, with the result that there is an observable pattern and a balance which add greatly to the book's value as a comprehensive survey, while in no way detracting from its interest as a series of authoritative articles.

The 18 chapters cover the scientific disciplines most affected by Antarctic research: Geology, Glaciology, Meteorology, Ionosphere, Aurora, Geomagnetism, Biology, Oceanography; and these must perhaps inevitably be of more sustained interest to the specialist or to the scientist of wide interests than to the "intelligent layman", though even the latter will find much that will interest him if he has the determination to keep on reading after his feet have left the ground. There are chapters, however, such as those on "The Oases in the Ice" by Professor R. H. Clark "The Land Beneath the Ice" by Dr. Charles Bentley, or "Birds and Mammals" by Dr. Ber-

nard Stonehouse, which will hold the interest throughout though they are in no way merely "popular" articles.

The only concessions to other interests than the scientific are the three chapters with which the book begins: "National Interests in Antarctica" by John Hanessian Jr. (U.S.A.), "Techniques of Living, Transport and Communication" by Phillip Law (Australia) and "The Mapping of Antarctica" by J. Holmes Miller (New Zealand). All three are of concern to anyone who is interested in Antarctic activities, Dr. Law's long article being of particular value as a "background to the news".

As Appendices readers have "The Antarctic Treaty", a list of National Stations in Antarctica since 1957, and bibliographies for each section.

There is little doubt that this volume will be as eagerly sought after as its predecessor, which was out of print even before its translation into Russian and Spanish.

L.B.Q.

#### FORBUSH AND THE PENGUINS.

Graham Billing. 192 pages. A. H. and A. W. Reed, Wellington, N.Z. Price 16s.

To those who admired Graham Billing's realistic, living reports of Antarctica, made when he was N.Z.P.A. Representative there, his book, "Forbush and the Penguins" may come as a disappointment.

Believing this to be "the first serious novel to come out of Antarctica since . . . I.G.Y.", Mr. Billing is, perhaps, setting his aims a little high. Serious in the sense that it contains no humour the book certainly is, but it cannot, surely, be taken seriously as in any way reflective of the Antarctic or many of the men who today or yesterday have worked there.

There is evidence of Billing's proven ability, as in any purely descriptive passages, such as that dealing with the blizzard lived through by the only character in the story — a young biologist studying the breeding period of the penguins at the Cape Royds rookery, the while, dreamin' o' his darlin' love. But so often description becomes lost in a comparable blizzard of would-be

intellectual metaphysics which left this reader, to continue the metaphor, cold.

Local colour is there aplenty. Every article of clothing mentioned is given its nature, colour, material and trimmings. Practically every place name of McMurdo Sound is mentioned, at least once, and there is plenty of Antarctic jargon, even if never translated.

Apart from the author's name, there is nothing in common between the vivid, authentic, direct Press reports that introduced it to the New Zealand reading world and the subsequent book, which is so reminiscent of the neo-intellectual short story — almost plot-less, not yet mature, its seams splitting with rather unlikely metaphysical padding, interlaced with "daring" references to sex, excreta, and body functions and organs, with an undercurrent of delight in the cruelty of animals, birds and nature.

Mr. Billing would, it seems, have done far better to rest on his well-deserved laurels as a first-class recorder and to have remembered that basic law of journalism — facts, not opinions. ,

O.P.A.W.

ANTARCTIC SNOW AND ICE STUDIES. Malcolm Mellor, Editor. 280 pp., illustrations, maps and diagrams. American Geophysical Union. List price \$12.00.

This second volume of the American Geophysical Union's Antarctic Research Series maintains the high standard set by the volume "Biology of the Antarctic Seas" noticed in our last issue. Malcolm Mellor, the editor, has had the unusual experience of participating in United States, United Kingdom and Australian Antarctic expeditions. The 10 papers include four which deal specifically with the Ross Ice Shelf: "Horizontal Strain and Absolute Movement of the Ross Ice Shelf between Ross Island and Roosevelt Island 1958-1963" (Zumberge), "The Ross Ice Shelf Survey 1962-1963" (Hofmann, Dorrer, Nottorp), "Snow Accumulation on the Ross Ice Shelf" (Heap, Rundle) and "Structural Glaciology of an Ice Layer in a Firn Fold" (Read). On the other hand, "Drain-

age Systems of Antarctica" (Giovinetto) is an attempt to estimate more accurately the mass input over the whole of the Antarctic ice sheet.

This handsome—and durable—volume is notable for the number of detailed charts, such as the folding maps giving details of the location and density details determined on U.S. traverses.

**THE GEOMORPHOLOGY AND GLACIAL GEOLOGY OF THE SOR-RONDANE, DRONNING MAUD LAND, ANTARCTICA.** T. Van Autenboer. Brussels. 91 pages, maps and illustrations. 250 Belgian francs.

This, to the layman, forbidding title conceals the fact that here is a thoroughly readable book about the impressive Sor-Rondane Mountains 200 k.m. south of the Belgian Roi Baudouin Antarctic base. The technical geological details are here, but the language in which they are expressed is much nearer to common speech than the language most scientists like to employ. The book is beautifully produced, there are abundant excellent photographs, and really explanatory diagrams and maps, the lay-out is clear, and the wide interests of the author are indicated by an historical introduction and by comment on climate and on the bird and plant life of the region.

Altogether a model of how such a scientific treatise on a limited area can be made valuable and even attractive to the ordinary reader.

[Orders should be addressed to Koninklijke Vlaamse Academie voor Wetenschappen, Letteren en Schone Kunsten van België, 1, rue Ducale, Bruxelles, 1, Belgium.]

## PUBLISHED IN NEW ZEALAND

**ANTARCTICA: 1963-64 NORTHERN FIELD PARTY:** Maurice Sheehan. N.Z. Alpine Jnl. XX (51) 1964: 230-4.

**THE GEOLOGY OF THE MIDDLE AND LOWER TAYLOR VALLEY OF SOUTH VICTORIA LAND, ANTARCTICA:** T. R. Haskell, J. P. Kennedy, W. M. Prebble, G. Smith and A. G. Willis. Trans. Roy. Soc. N.Z. Geology, 2 (12): 165. 169-86 (map in folder).

## N.Z. ANTARCTIC MAPS

The following detailed maps of particular areas of the Ross Dependency based upon geological and topographical expeditions under the New Zealand Antarctic Research Programme have been published by the Lands and Survey Department during the past year.

The maps may be purchased from the Map Sales Office, Government Buildings, Lambton Quay, Wellington.

### ALL N.Z.M.S. 166

**Byrd Neve** (1st Ed. 1964)  
Lat. 81° S.-80° S. Long. 150° E.-157° 30' E.

**Beaumont Bay** (1st Ed. 1964)  
Lat. 81° S.-82° S. Long. 157° 30' E.-165° E.

**Geologists Range** (1st Ed. 1964)  
Lat. 82° S.-83° S. Long. 150° E.-157° 30' E.

**Nimrod Glacier** (1st Ed. 1964)  
Lat. 82° S.-83° S. Long. 157° 30' E.-165° E.

**Mt. Rabot** (2nd Ed. 1964)  
Lat. 83° S.-84° S. Long. 156° E.-165° E.

**Mt. Hope** (2nd Ed. 1964)  
Lat. 83° S.-84° S. Long. 165° E.-180° E.

**Buckley Island** (1st Ed. 1964)  
Lat. 84° S.-85° S. Long. 150° E.-165° E.

**The Cloudmaker** (2nd Ed. 1964)  
Lat. 84° S.-85° S. Long. 165° E.-180° E.

**Shackleton Glacier** (1st Ed. May 1964—2nd Ed. October 1964)  
Lat. 84° S.-85° S. Long. 180° W.-165° W.

**Plunket Point** (1st Ed. 1964)  
Lat. 85° S.-86° S. Long. 165° E.-180° E.

**Liv Glacier** (1st Ed. 1964)  
Lat. 85° S.-86° S. Long. 180° W.-163° W.

The much used N.Z.M.S. 135, **Ross Sea Regions Map**, has been programmed for redrawing. The publication date is not known at this stage but will be quite some time yet—at least 12 months.

# ONE MORE FRONTIER CROSSED

## BENEATH THE SURFACE IN ANTARCTIC SEAS

Three scientists, with the help of U.S. Navy personnel, have succeeded in submerging a sub-ice observation chamber in the frigid waters of McMurdo Sound.

The chamber, which was dropped through a hole in the six-foot thick ice, consists of a capsule large enough for two scientists. It is reached through a chimney that extends above the surface of the ice and is anchored there. This gives the scientists an observation platform 15 to 20 feet below the surface.

Navy men spent eight hours submerging the bell once it was finally brought out to the ice of McMurdo Sound. Two D-4 Caterpillar tractors, one rigged with a large boom, and a ten-ton sled with an A-frame and skaggit winch were needed. The chamber is held in place by three arms that extend from the top of the entrance tube to "dead men" set in the ice. It is buoyant, and a counter-balance arm extends from the bottom, so that it will float upright should the ice give way. Floodlights are attached to illuminate the surrounding area.

Biologists from the Woods Hole Oceanographic Institution and New York Zoological Society co-operated in the project which was financed by a National Science Foundation grant.

### LISTENING IN

Observers entered the capsule through a "chimney" extending to the surface and viewed what was going on in the murky waters through the six windows of the chamber. They listened to sounds piped in from a hydrophone in the water outside.

The men took turns over a two-week period sitting alone in the 6ft.-high, 4ft.-wide bucket-shaped steel capsule. They said the noises they heard were most closely described as whistles, buzzes, beeps and chirps and often sounded like something unearthly.

Dr. Carleton Ray, a biologist of the New York Zoological Society and co-leader of the project, said seals swimming gracefully were around

most of the time, often going to the hole chipped in the ice through which the chamber was submerged, or inspecting the chamber itself.



A zoologist sits in the U.S.A.R.P. sub-ice observation chamber while a diver takes photos.

N.S.F. photo by Dr. C. Ray.

### UNDERWATER RACKET

An authority on whale and seal sounds, Mr. W. E. Schevill, of the Woods Hole Oceanographic Institution, said he had never heard such an underwater racket before. The animal responsible for the noises was the Weddell seal, an Antarctic species that grows to about 11ft. long and 1300lb. in weight.

The scientists reported sighting few fish but that a strikingly coloured jellyfish with an umbrella 4ft. across and tentacles 30ft. long floated by. According to Mr. Schevill all the sounds heard by the scientists undoubtedly served one or more purposes. "Perhaps the Weddells use them for communication and, as

with bats and whales, for sonar navigation," he said. "Sonar would explain how they find food and breathing holes, especially in the total darkness of the Antarctic winter night.

"We will carefully analyse this jumble of sounds, together with our field observations, in the laboratory for clues to the languages.

"The sound tracks must be analysed with instruments for full understanding, because seal voices have many characteristics that humans cannot hear, such as very high frequencies and rapid pulses too close together to distinguish. This process will take several months, and the conclusions must be proven by experiments with captive seals."

He added that investigators will also try to determine how the seals make the weird sounds. Weddell seals keep their mouths and nostrils closed under water.

The scientists called the visibility "remarkable", noting that the range of sight was more than 200 feet. The range of the hydrophones was more than five miles, and the observers could hear hundreds of seals they could not see.

### PLANT LIFE TOO

Two undersea explorers are seeking out ocean bottom plant life in ice-filled waters along the shores and islands of the Ross Sea, in the cold hunting grounds of Leopard seals and Killer whales.

The underwater pioneers are James M. Curtis (21) and Jack K. Fletcher (19), both students at Old Dominion College, Norfolk, Virginia. They have accompanied Professor J. S. Zaneveld on a five-month trip to the south to collect Antarctic seaweeds and to chart their distribution.

The students wear black rubber "frog man" suits that flood with ice water when they plunge into the 29°F brine. After a few chilling moments the water warms enough to allow them a maximum of about 45 minutes submerged. They often enter the breathing holes of Weddell seals to dive beneath ice up to seven feet thick.

### HAZARDS UNDER WATER

Once Curtis had taken some chunks of ice out of a Weddell hole with his hands and was about to step in when suddenly the head and long neck of a Leopard seal popped up. "It stared at me with what appeared to be an evil grin for a while before sinking back into the dark water. Leopard seals grow to about 12 feet long and weigh up to a thousand pounds, so we decided to dive elsewhere," Curtis said.

Killer whales have also been sighted near their diving areas but they have never been close enough to present a threat. Both men strap knives to their legs as a precaution.

The Old Dominion group is investigating accessible points along the 350 mile long western coast of the Ross Sea, and several island shores. A Harvard University team is doing similar research off the tip of the Antarctic Peninsula. Both projects are part of the U.S. Antarctic Research Programme.

Dr. Zaneveld hopes to discover what kinds of seaweeds are in the Antarctic, where each type grows, when the growing season is, how much seaweed of each kind there is, and finally why the discovered growth patterns exist. His major finding so far is that large beds of red seaweed grow under ice several feet thick, where little light penetrates. He dived for seaweed in the Caribbean for several years in the past, but during Antarctic diving operations he keeps watch at the surface, holding a life line tied to the waist of one of the divers.

### OCEAN BOTTOM LANDSCAPE

Describing Antarctic ocean bottom scenery, Curtis said "A typical under ice view shows very clear ink blue water pierced by a shaft of light from the seal hole. Red seaweeds grow abundantly on the sloping, rocky bottom. Large red or white starfish cover the upper slope, and sponges up to nearly four feet across cover the lower slope, which fades into blackness farther down. Five foot long worms, sea anemones, bottom fish, and various shellfish are scattered about.

# WE SHOULD HAVE HELICOPTERS

H. S. GAIR

[We are pleased to publish this forthright plea by Harry Gair, district geologist in the Christchurch office of the New Zealand Geological Survey. Mr. Gair was leader of New Zealand's Northern Geological and Survey team in Victoria Land in 1962-63 and this summer was with a United States field party far to the South, so he has had experience of both dog-sledging and the use of helicopters for Antarctic survey work.—Ed.]

I was a member of the Institute of Polar Studies party from the Ohio State University under the leadership of Dr. Faure. They went in the field, in the Wisconsin Range, at the beginning of November and were using motor toboggans until December 18 when the U.S. Army Helicopters Detachment under the command of Major Hampton moved from the Shackleton glacier to provide them with logistic support. My arrival coincided with that of the helicopters so I did not have the opportunity of any field experience with the motor-toboggans apart from the odd short trip from the camp.

The helicopters were used from December 18 to January 16, and I must say that I am completely "sold"

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"Weddell seals, nine feet long and weighing a thousand pounds, cruise nearby. In open water, penguins sometimes zip across the surface overhead looking almost as if they were flying through the air. Late in the season plankton coats the underside of the ice, making the water almost pitch black. Light manages to get through in spots, and the ice above resembles a star-filled sky."

Curtis and Fletcher usually dive two or three times a day while in the field: a full day's work because the intense cold makes the average 15 minute dive an exhausting event.

For three months the marine biologists were flown to various campsites by "Deep Freeze" helicopters, and returned to McMurdo to process their specimens. They departed for home on January 10.

on the value of helicopters for Antarctic field operations such as geology. Incidentally I think we could do with a few helicopters in New Zealand, but I will return to this point later. When one considers the total cost of operations in the Antarctic, and particularly the logistics, it does not seem to make sense to equip field parties with dog teams, or even motor-toboggans or any other form of ground transport, when with helicopters one can do in hours the work that takes days or even weeks to do using methods of ground transport. In addition helicopters have the added advantage that they can visit outcrops not otherwise accessible. Furthermore, since the helicopters used belonged to one of the United States Armed Services and would probably be flying almost as many hours back in the States on training missions, etc. (all at the taxpayers' expense), I think a good argument could be put forward for using this flying to such purpose as Antarctic Research. In other words it is the job of the helicopters to fly so let's put them to work where they can be of assistance for other work and at the same time provide the pilots and maintenance staff with good experience. According to the pilots Antarctic flying is quite unique experience, and who can deny that this may be of considerable use some day?—Antarctic conditions are not something that can be duplicated in a laboratory!

A few details of the performance of the helicopter we used might be of interest. They are known as UH-1B's and are turbo-powered. Their ceiling is reputedly 17,000 ft., but in the Antarctic, because of the dense atmosphere, it is probably much higher than this; and they can land up to 13,500 ft. but above this landings become progressively hazardous and difficult particularly in gusty conditions. We were making landings daily at heights of 9,000 to 11,000 ft. They can fly in winds up to

35-40 knots and we were flying in winds of up to 30 knots gusting up to 45 knots—gusty conditions are the most difficult and hence hazardous for the pilots to handle particularly on landing and take-offs. They have a crew of two, a range of about 400-500 miles, a cruising speed of 80-90 knots and can carry about the same load as an Otter (payload is quoted as 2,000 lb.). The Army had three planes operating continuously—the one I was in was fitted with an extra fuel tank under the rear seats and this gave another 1 to 1½ hours' flying time. They also require no warming-up period before take-off, nor do the motors require pre-warming before starting, as is the case with piston engines.

### SAFETY FACTOR

One of the first questions I put to our pilot was what happens if our engine cuts? He said we go into auto rotation providing our speed and height are sufficient. I then, of course, asked the obvious follow-up question and was told that the ideal minimum height to fly at above the ground surface was about 500 ft. and that the air speed should be at least 50 knots. Successful auto-rotation landings from heights below 500 ft. have been made but they become progressively difficult with lower altitude. Some of the pilots had recent experience in Viet Nam and they found there that flying at high speeds within a few feet of the ground in order to avoid ground fire they could still go into auto-rotation provided they noticed the engine had cut in time. This latter statement sounds surprising but the point is that with a turbine engine unless a pilot happens to have his eye on the engine torque gauge or has very keen senses, there is likely to be a delay of six or eight seconds before he would notice an engine failure (unlike a piston engine where a power failure is noticed immediately) because of the free-running characteristic of the turbine. I understand that safe auto-rotation landings have been made from ground level altitudes with the pilot not having noticed immediately his engine failure but the pilots who

have accomplished such safe landings are considered extremely fortunate. In the case of these low-level auto-rotations the plane follows a parabolic line upwards losing speed and gaining height rapidly (the pilot trades speed for height) and then "theoretically" settles down like a falling sycamore leaf.

The problem of fuel and other supplies for the helicopters was very capably handled by Squadron VX6 of the U.S. Navy, firstly by C130 Hercules and later by R4D's (owing to a Hercules opening up several large crevasses during a landing the strip was placed out of bounds for Hercules and all subsequent supplies were flown in by R4D).

### FEW MEN NEEDED

I was most surprised and impressed at the small number of men the Army had to operate and maintain their helicopters—twelve men consisting of five pilots, five maintenance staff, a medical officer and a cook (who returned to the U.S.A. early on because of a family bereavement) were all the men needed to fly and maintain the aircraft. We needed more geologists to cope with the number of hours they were prepared to fly the aircraft—a geologist and assistant per pilot is the optimum as with five pilots for three helicopters they just wore the geologists out with work!

Returning now to the question of helicopters in New Zealand, it seems to me, firstly, that our Armed Services cannot be considered complete without a helicopter detachment and that, aside from this, there is the point that many Government departments such as Ministry of Works, Forest Service, Lands and Survey, D.S.I.R., etc., could put helicopters to very good and productive use both from the saving of time and cost point of view.

# The New Zealand Antarctic Society

is a group of New Zealanders, some of whom have seen Antarctica for themselves, but all vitally interested in some phase of Antarctic exploration, development or research.

You are invited to become a member.

## BRANCH SECRETARIES

Wellington: W. J. P. Macdonald, Box 2110, Wellington.

Canterbury: Miss Helen S. Hill, Box 404, Christchurch, or  
194 Knowles St., Christchurch 5.

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## SOCIETY TIES

The local manufacturers have received the bulk material for the N.Z. Antarctic Society tie from overseas, and the first 'run' is now in make. The design is similar to those used for the ties of kindred organisations in the United Kingdom and Australia: in fact, the ANARE Club tie was used in the working up of the New Zealand design. Thank you, Australia. The dark blue background, light blue and white stripes and motif of penguins and kiwis provide a striking pattern, yet a reserved note is retained over all.

Ties will be available through N.Z. and Branch secretaries of the Society at a cost of 17/6. A special information notice is being issued to members with this issue of "ANTARCTIC."

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are OUT OF PRINT. Copies of other issues may be obtained from the Secretary of the Society, Box 2110, Wellington, at a cost of 5/- per copy. Indexes for volumes 1 and 2 are also available, price 2/6 each index.

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