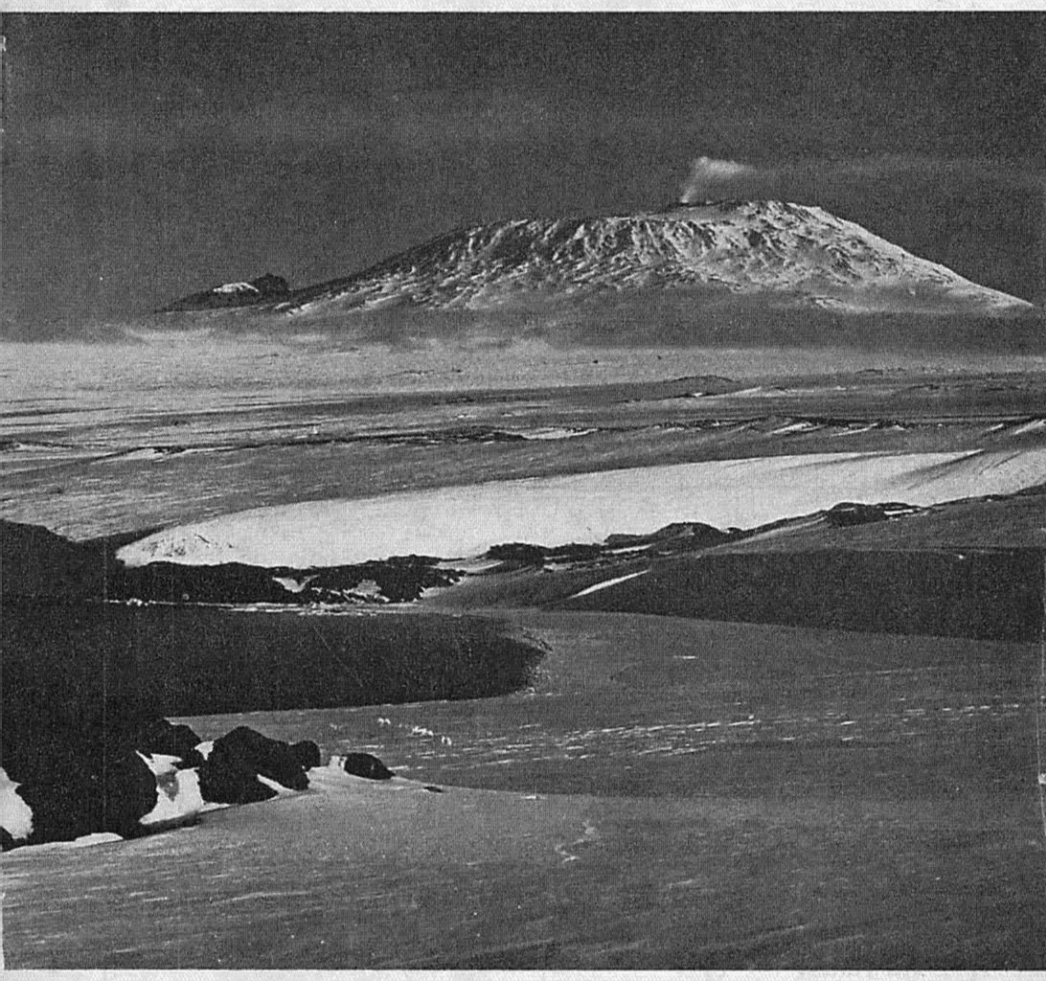
ANTARCTIC

A NEWS BULLETIN

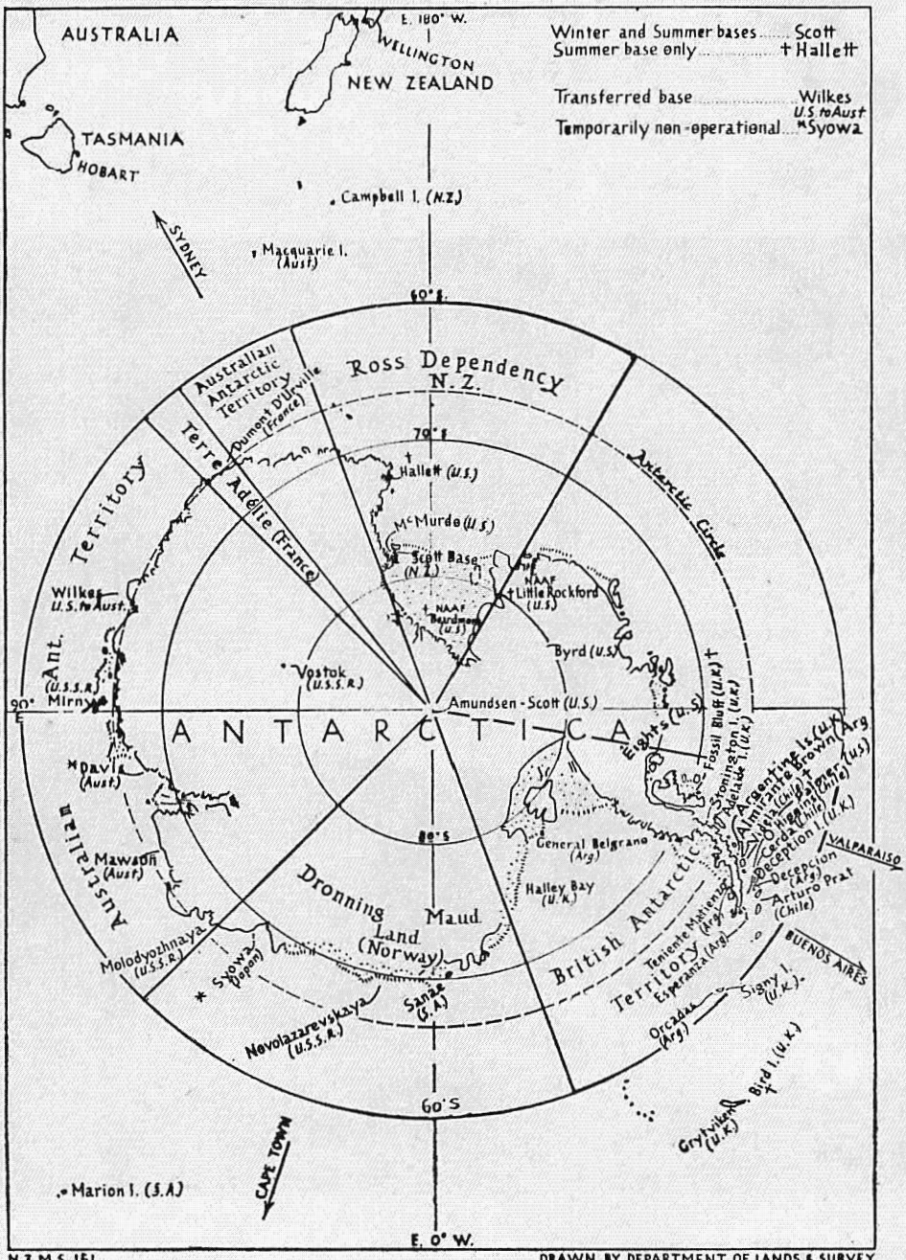
published quarterly by the

NEW ZEALAND ANTARCTIC SOCIETY



MOUNT EREBUS FROM ROCKY POINT, CAPE ROYDS.

Vol. 5, No. 1 MARCH, 1968



N.Z.M.S. 161

DRAWN BY DEPARTMENT OF LANDS & SURVEY
WELLINGTON, NEW ZEALAND, MAR. 1964
2ND EDITION

"ANTARCTIC"

(Successor to "Antarctic News Bulletin")

Vol. 5, No. 1 MARCH, 1968

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THE RENNICK GLACIER GEOLOGICAL EXPEDITION 1967-68

By D. G. Massam

This summer a six-man field party spent ten weeks working in the mountainous area between the Rennick and Lillie Glaciers in northern Victoria Land, and also covered a smaller area known as the Marazumi Range (see map in September 1967 issue).

The party consisted of D. G. Massam (Leader), M. J. Sheehan (Deputy Leader), J. A. S. Dow (Senior Geologist), V. E. Neall (Geologist), G. L. Champness (Field Assistant), and J. Glasgow (Field Assistant).

The party was flown into the field on November 11 by U.S. Navy Hercules and landed in the Quartzite Range, some thirty miles north of our intended put-in site on the Evans Nevé at 72° 04′ S, 165° 07′ E. We experienced our first blizzard a day later: it lasted for 40 hours. Then we worked our way north towards our fuel depot on the Leap Year Glacier. Two-man geological parties worked both the East and West Quartzite Ranges and the area between the Salamander Range and the Ring Range adjacent to the Black Glacier. Soft snow conditions in the Leap Year Glacier made the going very slow and cold: temperatures over this period (—32°F) made life very trying.

Our fuel depot was reached on November 23. Here a couple of days were spent doing geological work and preparing gear for a three week trip down to the Rennick Glacier.

We left for the Rennick Glacier and the Marazumi Range via the Sledgers Glacier on November 27. This was the most difficult area we encountered, as a number of ice falls had to be negotiated and crevasses caused a lot of worry during this period, especially in the Lower Rennick. From November 27 till December 20, we travelled as far north down the Rennick as Frolov Ridge in the Explorers Range, then returned over our same route to Mt. Soza, where we had made a fuel dump. From here we headed west across the Rennick to the Marazumi Range and spent a few days exploring the Eastern side of the range. We climbed a very nice granite peak while in the area, and good granite and beacon-dolerite sequences were studied by the geologists.

We returned across the Rennick to Mt. Soza. An attempt was made to climb this prominent peak but without success. Side trips up the Carryer Glacier and in the Sledgers Glacier were made but difficult terrain restricted the outcrops visited. While returning up the Sledgers, one toboggan broke down and had to be towed back to depot. We were due to be resupplied on December 20, but it was not till the 24th that we actually received the re-supply. On December 26, after recovering from the effect of the Christmas cheer, we headed north once more for the upper Graveson Glacier and the Edlin Neve at the head of the Carryer Glacier. Fortunately we managed to force a route over a high saddle from the Graveson to the Edlin Neve, without too much difficulty. Very soft snow restricted travel in the Neve but a very good

POLARIS TOBOGGAN FINDS A GAP

The toboggan was balanced on the lip of a seemingly bottomless crevasse on Sledgers Glacier. Had it gone down, the sledge it was towing would have disappeared too.

find of Archaeocyathid fossils in a reef-like structure of limestone made the visit well worth while.

A number of 8500′ peaks were climbed while in this area also. Two-man geological parties visited east and west sides of the Graveson Glacier on our way back to depot.

The last part of the trip into the Freyberg Mountains was frustrated by bad weather. Numerous visits were made up the Western side of the Canham Glacier as far south as Gallipoli Heights, though once again this was restricted by crevasses.

Our second blizzard was encountered while camped off Gallipoli Heights. This lasted for 50 hours, but cleared in time for us to be picked up by Hercules G130 on January 20.

The motor toboggans handled most of the conditions very well and we had very little in the way of major breakdowns. These machines are extremely well suited to this kind of geological trip.

It may be of interest to note that the 70 days were devoted to travel, 20 days; geology, 27 days; lie up, 23 days.

SCOUTS RETURN

The three Queen's Scouts, Kelvin Walls, Stephen Hall and Tom Brummer left Scott Base for home on the "Pte. John R. Towle" on January 12 after 10 days working with the support and scientific staff, with time for visits to the Royds hut (by helicopter) and an ice cave near base, and a short dog-sledging trip.

SUMMER WORK

As well as the routine scientific observations at Scott Base, the programme outlined in our September issue was carried out substantially as planned. This year the R.N.Z.A.F. again materially assisted the programme by making three Hercules flights between New Zealand and the Antarctic.

NUCLEAR SAMPLING

At Scott Base, the U.S. Pole, Byrd and Plateau stations, and on "Endeavour" at every three degrees of latitude samples of snow, ice and water were collected for the study of nuclear products occurring both naturally and as the result of nuclear explosions.

ZOOLOGISTS AT ROYDS

Gathering material for a doctorate in zoology has taken a 26-year-old German from the South Pacific islands of New Caledonia and Fiji to New Zealand and then Antarctica.

Mr. H. K. Schminke, from Christian-Albrechts University of Kiel, West Germany, this summer worked near Shackleton's hut at Cape Royds.

He also spent some time in the Dry Valley region.

Mr. Schminke, who is working with Dr. C. B. Kensler, of the fisheries division of the New Zealand Marine Department, is studying interstitial fauna — microscopic aquatic animals living in the sands of beaches and rivers — in search of zoo-geographic relationships.

He said little was known about the subject in New Zealand, Australia, adjacent territories and Antarctica.

Mr. Schminke, who lists linguistics among his hobbies, worked in New Zealand for seven months and before returning to Germany, he will spend some time in Australia.

He hopes to finish his doctorate in about two years.

UNIVERSITY TEAMS

VUWAE 12

For the 12th Victoria University of Wellington expedition, four two-man teams

(1) examined the ice tongues in the Dry Valleys, and moraines on Erebus, and made ablation measurements at Byrd, Pole and Plateau stations in the course of a study of the glacial history of the Ross Dependency and the ice budget of the Antarctic ice sheet.

(2) studied the heat flow through the bottom of McMurdo Sound, Lake Bonney and Lake Vanda.

(3) made geological, glaciological and soil studies in the Dry Valleys, and

(4) carried out proton magnetometer observations during "Endeavour's" first cruise.

UNIVERSITY OF OTAGO

At Cape Hallett two men, following up work done previously by the Dominion Museum and the University of Otago, gave special attention to the effect of man on the Adélie penguin and Skua colonies on the Cape.

CANTERBURY UNIVERSITY BIOLOGICAL TEAM

Dr. Euan Young, leader of the biological party at Cape Bird, returned to New Zealand on January 20, leaving photographer J. T. Darby in charge of the team, to complete the seasonal investigations into Adélie penguin and skua relationships at the rookery and work on terrestrial invertebrates. The four men left behind returned to Scott Base on February 15 ofter spending over four months at Cape Bird. Darby stated that several "exciting" discoveries had been made about behavioural patterns at the rookery. He completed his film on the predatory effects of skua on penguin. This will have its world premiere at an international symposium on Antarctic biology at Cambridge in August and will then be adapted for a TV documentary series.

Two other Canterbury men continued the study of the population dynamics and behaviour characteristics of the Weddell Seal, working from Scott Base and Cape Hallett. When Mossop suffered a broken ankle while skiing, Stirling was assisted by other Scott Base personnel.

FOOD FOR MAN?

Samples of Antarctic Krill were obtained for the Food Technology Department of the Massey University of Manawatu, in association with the Fisheries Industries Board, for investigation of Krill as a source of food for human consumption.

ON ELTANIN

A D.S.I.R. technician and a graduate of the Victoria University of Wellington carried out seismic and magnetic work on U.S.N.S. "Eltanin" for Lamont Geological Observatory, U.S.A.

FIVE YEAR PLAN

The current five-year plan for New Zealand Antarctic research expires at the end of next summer. A new long-term plan is now being formulated by the Ross Dependency Research Committee for Cabinet approval. Four members of the R.D.R.C., Dr. E. I. Robertson (Chairman), Dr. T. Hatherton, Dr. M. C. Probine and Mr. D. Kear visited the Antarctic in November. Dr. Robertson said that more specialised geological and geophysical projects would be undertaken on key problems in the Ross Dependency, so staff selection would become more critical.

VOLUME 4

Our last issue, December 1967, was the last number of volume 4. As usual, a full **Index** is being prepared, and is expected to be available in a few weeks' time. Orders may be forwarded to the Secretary, N.Z. Antarctic Society, P.O. Box 2110, Wellington, with remittance of 30c per copy.

Arrangements for uniform binding will be announced later.

A bound, indexed volume is invaluable.

VANDA STATION

On February 15 the third hut for the new New Zealand station at Lake Vanda in the Wright Dry Valley was transported from Cape Royds, where it had been erected in the spring of 1963 for the use of biologists working at the Adélie penguin rookery. (See "Antarctic" Dec. 1963, p. 324.)

The operation took two days. After six hours spent dismantling the 420 sq. ft. hut it required three hours to carry the prefabricated sections by helicopter to the "Burton Island" standing off the cape three quarters of a mile away. Another three hours was needed for the icebreaker to carry the hut across McMurdo Sound to the Wilson Piedmont ice. Here the helicopter was again used to carry the hut-sections to Hogback Hill behind Marble Point. The four-man working party from Scott Base, led by the Base Leader, W. J. Webb, now securely tied down the hut sections for the winter.

Next Spring the hut will be taken by tractor train over 30 miles of difficult country to the Wright Valley and erected at Lake Vanda.

During the operation, Webb had the tissue surrounding the end joint of one finger torn away on the underside, and the finger had to be splinted for three weeks.

KIWI GUINEA-PIGS

Sleeping habits of the 12 New Zealanders who are about to spend the polar night in Antarctica are to be studied by a team of American psychiatrists.

The study is to obtain information for a research project started last season by Drs. J. T. Shurley and C. M. Pierce from the Oklahoma Medical Research Foundation.

For week-long periods starting last month and continuing in May, June and August, the men will complete computer cards, recording for every half-hour the time spent working, eating, relaxing and sleeping.

THE ROAD TO SCOTT BASE

by A. J. Heine

In December 1956, a "bulldozer" from N.A.F. McMurdo travelled down the eastern slopes of Crater Hill to Pram Point to level off the site for Scott Base. The track of the bulldozer served as a useful overland route marker between the two bases for several years. During the 1959-60 summer, the deterioration of the sea ice east of "The Gap" compelled the U.S. Navy to haul heavy cargo overland from N.A.F. McMurdo to Scott Base, and then out to the Ice Shelf via the pressure "rollers" north-east of Prame Point. The route down the slopes of Crater Hill was several hundred yards north of the original 1956 track, but was still a very steep direct "road".

In 1960, while at the Institute of Polar Studies, Ohio State University, I compiled a report for the U.S. Navy titled "The Access Routes from Hut Point to Pram Point, Ross Island".* In this report, I drew attention to the possibility of the sea ice, to the east of "The Gap", disintegrating in January and February, thereby cutting off all vehicle access to air fields and "skiways" on the McMurdo Ice Shelf. I suggested that a properly formed road be built overland between the New Zealand and United States Bases.

At the beginning of the 1963–64 summer, the U.S. Navy began to construct a formed road to their transmitter complex on the plateau north of "The Gap". This road ran from the eastern side of "The Gap", north towards Crater Hill and then swung back to the "aerial farm". There still remained the obstacle of hard ice at the top of the "Ski slopes", south of Pram Point, before the new U.S. Navy road could join up with the original route down to Scott Base.

*Later modified and published in the Journal of Geology & Geophysics, Vol. 6, No. 3, June 1963, as "Ice Breakout around the Southern end of Ross Island, Antarctica".

During the 1963–64 summer, New Zealand took to the Antarctic two wheeled-vehicles to test under Antarctic conditions. The first was a long-wheel base Land Rover and the second, a Fiat 500D motor car. There was already a Land Rover at Scott Base (taken down by the R.N.Z.A.F. during the 1959/60 summer) but this had mainly been used on the sea ice route through "The Gap". In order to test the overland route, I took up a Ferguson and back-blade, to clear the existing rough trail. The stretch of hard ice joining the two sections of all rock road, was cleared of snow and made more or less negotiable. The Fiat made several trips across the whole route but the extremely steep grade proved too much for such a small vehicle and the clutch was damaged. Nevertheless, one eventful trip was to take over to McMurdo the seriously ill radio operator Ted Gawn, next day flown back to N.Z. with acute appendicitis. The new Land Rover arrived on the "Endeavour" a week or so later, and this lower-geared vehicle handled the steep slopes without difficulty. However, the sea ice route to "The Gap" was negotiable to tracked vehicles throughout the summer, and it was not necessary to use the overland route to any great extent.

During the 1964/65 summer, the sea ice route continued usable by tracked vehicles throughout the summer period, although a breakout close to the eastern side of "The Gap" renewed interest in a properly formed overland route. High maintenance costs of tracked vehicles had shown that wheeled vehicles would be more economical to use in the McMurdo area, but the high temperatures during January usually made travel on the snow covered sea ice a risky business, because of the ease with which the wheeled vehicle became bogged down. At this

stage, low pressure tyres were not yet available.

In December 1965, the Base Engineer of Scott Base, Norm Dawson, borrowed a D8 "bulldozer" from the U.S. Navy and began the reconstruction of the road close to Scott Base. Later, the Navy themselves took over the job and surveyed out a route of reasonable grade. This then formed the road itself, some distance to the north of the 59/60 route.

This road, together with a compacted snow road, was used extensively by the U.S. Navy in taking supplies and personnel to their air fields on the Ice Shelf. Two heavy articulated truck units were used, as well as a large bus, all on low pressure tyres. Occasionally, the traction of the low pressure tyres proved too poor on the still fairly steep grade of the hill section, and the trucks sometimes required assistance from a crawler tractor to make the grade. With the establishment of the Outer Williams Runways for wheeled aircraft, about 14 miles from Scott Base, wheeled transport proved its worth, as instead of a speed of 3–5 miles per hour for crawler tractors, trucks could travel at 30–40 miles per hour, on the level Ice Shelf.

The sea ice breakout in February 1966 brought open water to the shore of Pram Point and completely cut off access to N.A.F. McMurdo except by the overland Crater Hill road. As the breakout left a high cliff to the east of "The Gap", access to the American base during the 1966 winter was maintained via the overland road. The U.S. Navy had completed the Hut Point-"The Gap" "Motorway" and this road was of high standard indeed.

During the 1966/67 summer, the overland road to Scott Base was again extensively used, as the ice breakout came up to the Pram Point shoreline. Then, in the early part of the 1967/68 summer, the U.S. Navy began the reconstruction of "The Gap"-Scott Base section and this has now been completed.

The road from Scott Base to Hut Point is a well-made one, and of a much higher standard of construction than many country roads in New Zealand. It has been built up above the surrounding landscape to prevent excessive snow drifting, and apart from the one or two unavoidable sidlings, should remain free of snow throughout the year. Again this year, compacted snow roads have been built across the Ice Shelf, and wheeled transport is used extensively.

During the building of Scott Base in January 1957, materials and supplies were hauled across the sea ice and around Cape Armitage to Pram Point, taking 3–4 hours for the round trip. Scott Base re-supply is now unloaded onto the shore at Hut Point and trucked to Scott Base in a quarter of the time taken in 1957.

CHRISTMAS CHEER

Christmas cakes, home-made biscuits and pies are annually sent to New Zealanders in Antarctica by the Canterbury branch of the New Zealand Antarctic Society. The parcels are flown from Deep Freeze headquarters, Christchurch, to McMurdo Sound Station. Some of the parcels are distributed among the New Zealanders at Scott Base.

This year other parcels were parachuted to the 19 men working at Lake Vanda, Rennick Glacier, the McMurdo ice shelf, and Capes Bird and Hallett.

Some 50 dozen home-made biscuits and six Christmas cakes were made by members of the branch.

GOOD NEWS

When a U.S. ski-equipped Hercules landed beside New Zealand's major field party for half an hour late in December, it brought the explorers 150 lb of mail. This included a letter from Victoria University confirming that one of the field party, V. E. Neall, had obtained a first class honours pass for his B.Sc. degree in geology. Congratulations, Vince, from our readers.

SIX MEN CLIMB EREBUS

An Italian, who is one of the world's finest mountaineers, accompanied a party of five New Zealanders on a traverse in early January to check snow accumulation markers on the slopes of Mount Erebus, and, if possible, to climb Mt. Erebus itself.

A photographer and journalist for "Corriere della Sera", Mr. Carlo Mauri was covering the activities of the New Zealand Antarctic Research Programme. He is a veteran of climbs in Europe, South America, Greenland, Africa, the Himalayas and New Guinea.

The snow accumulation markers are at 1000 ft. intervals on Mount Erebus and the data from them is required for a long-term glaciological project on the surrounding McMurdo ice shelf.

The expedition left Scott Base on January 4, equipped with two motor toboggans and a dog team of 11. Besides high-altitude polar climbing equipment, the party took food and fuel for more than 14 days.

The traverse party, under W. R. Lucy, comprised Mr. Mauri, N. B. Pitts, R. J. Cowan, R. V. Barton, and B. C. McAleer.

The men wanted to test a new type of motor toboggan, which is being considered as a possible replacement for field work.

In a radio message to Scott Base on January 7, the leader said that because of the recently-fallen snow, it took much longer than expected to reach the saddle between Mounts Erebus and Terra Nova and set up a base camp at the predetermined site.

In spite of heavy snow falls on January 7 and 8, surface conditions were now good, and on January 9 the Italian flag, lashed to an ice axe, was raised alongside the New Zealand ensign by Mr. Mauri, on the summit, 13,500 ft. Two hours were spent at the mountain's crater peak, and then the team travelled to the lesser peak of Mt. Terra Nova nearby and climbed it on January 10.

ON THE SUMMIT
Italian and N.Z. flags.

Delays during the early stages of the expedition, and a shortage of fuel, prevented the men sledging a further 15 miles to the upper slopes of Mt. Terror (10,075 ft.) and they now returned to Scott Base.

Mr. Lucy said that travelling from the base camp 6500 ft. up Mt. Erebus, it took 11 hours to check the snow accumulation markers, climb to the summit and return.

"Temperatures during the climb ranged between 20 and 30 degrees below and there was a chilling wind of about 15 knots for most of the day," he said.

"We had similar conditions when working on Mt. Terra Nova."

The dog team had worked very hard and the new type of motor toboggan performed beyond expectations.

"ENDEAVOUR"

This summer H.M.N.Z.S. "Endeavour" made two cruises to the Antarctic. The ice was proving "difficult" and "Endeavour" made rendezvous with the icebreaker "Westwind" about 200 miles northeast of Cape Adare, just south of the Antarctic Circle. Further south, U.S. icebreakers had carved a channel through solid pack from its edge off Cape Royds to Winter Quarters Bay, McMurdo, where discharging of cargo took place. "Endeavour" carried about 30 tons of general stores, etc., and 1500 tons of petroleum, both aviation and motor spirit.

Arriving at McMurdo on the 14th, there was a round the clock shuttle-service with motor vehicles and heavy trailers over the three mile formed route to Scott Base.

Leaving for New Zealand on January 16, "Endeavour" became ice-bound for a while at the "mouth" of the Ross Sea, where dense floes plus heavy seas and a strong following wind made it necessary to accept the help of "Westwind" again to reach open sea. "Endeavour" arrived at Lyttelton on January 26.

On her second voyage with approximately the same tonnage of cargo, "Endeavour" left Lyttelton on February 8 and reached McMurdo on February 17. On board were oceanographers and other scientists. Special attention was paid to the Pennel Bank.

Commanding "Endeavour" for the first time was Commander D. G. Bamfield, who was Executive Officer on the old "Endeavour" in 1958-9, led the team which brought the new "Endeavour" (ex Namakagon) from San Francisco in 1962, and was then Executive Officer of the new "Endeavour".

OFFICER INJURED

Lieut.-Commander B. E. Commons of Auckland, the "Endeavour's" executive officer, was flown to Christchurch from McMurdo on February 18 with a foot injury, following a fall on the ice a few days earlier. He was flown from Christchurch to Wellington and admitted to Wellington Hospital on the 19th.

OVER!!

Brian Lochore, captain of the 1967 All Blacks, was a guest of the U.S. Navy during a five-day visit to the Antarctic in January. During his visit he became the first man ever to kick a football over the South Pole.

LEADER: 1969

Appointed Leader at Scott Base for next year is

ROBIN FOUBISTER

Aged 34, Mr. Foubister has just spent twelve months as Officer in Charge of the meteorological station on sub-Antarctic Campbell Island. He was born at Lyttelton and was for four years a pupil of Christchurch Boys' High School, where 1967 Leader Colin Clark was also educated. He was an apprentice fitter and turner 1950-1955, and then went to sea as a marine engineer for 18 months with the N.Z. Shipping Co., on the vessels "Suffolk" and "Hinakura", trading on the "home run" to the United Kingdom. He then spent two years on a working holiday in the United Kingdom with travel on the continent, before returning to New Zealand as engineer on the Taranaki Harbour Board's new dredge "Ngamotu" on its delivery voyage in 1959.

He now served as maintenance engineer for several Christchurch factories and as draughtsman with Austral Standard Cables, and was sales manager for A. M. Satherthwaite & Co. of Christchurch before leaving for his year on Campbell Island, 1966-7.

Mr. Foubister played senior rugby for the Linwood Club and also when in England for the Wasps Club in London. He has been a member of the New Brighton Surf Club since boyhood and represented the club in N.Z. Surf Association championships, being a member of the championship-winning crew in 1961. He has also had considerable skiing experience with the Craigieburn Valley Ski Club.

TO WINTER OVER

The eleventh man to complete the wintering team at Scott Base is GRAHAME R. CHAMPNESS (22) of Mount Cook where he is a National Park ranger. He was born at Lower Hutt and educated at Ashburton primary and post-primary schools. He has been employed ever since leaving school by the National Parks Board at the Milford Track, Franz Josef Glacier and Mount Cook. He is keenly interested in natural history and is a competent photographer. He is single.

HUSKY IN HOSPITAL

A 6-year-old Greenland Husky, named Chris, has had a successful entropion operation at McMurdo hospital that restored the sight of his left eye.

The delicate operation, which involved removing a section of an inverted upper eyelid, was carried out by Lieutenant Doctor D. R. Butler, of the United States Navy, and a team of six in an hour and a half.

Now fully recovered, he is able to return to his work as team leader hauling the New Zealanders' sledge.

"It was a tricky operation," said the sole physician. All information on a similar operation for a human was looked up in medical books and an injection given to put the animal to sleep.

The dose proved too powerful, and the husky was "out cold" for three days after his operation. Other drugs were administered to counteract the effect of the injection and glucose was administered to keep the husky alive.

Even after three days the dog was pretty wobbly on his feet, but is now fully recovered.

While Chris was in hospital, regular progress bulletins were followed with much interest by personnel at McMurdo Station and Scott Base.

McMURDO ICE SHELF PROJECT

A Preliminary Report by A. J. Heine

The McMurdo Ice Shelf Project continued during the 1967–68 summer. I was designated overall Project Leader with Bill Lucy in charge of all the survey activities of the Project. Assistant Surveyor was Nigel Pitts and Field Assistant to the Project was Roger Barton. During drilling operations, I was assisted by John Lythgoe, Assistant Maintenance Officer of Scott Base. Except that I spent only November and December in Antarctica, all these men were away from New Zealand from October 1967 to February 1968.

The primary grid of survey stations set out on the McMurdo Ice Shelf during the 1963–64 summer was resurveyed for the last time. The markers for the strain triangles were well buried (up to five feet) and there was considerable digging required before the chaining of these points could be made. These "strain lines" will not be remeasured, as I now have sufficient data, but the main stations, will be continued to be well marked for future reference.

A number of intermediate stations were also resurveyed as well as a small number of auxiliary strain lines. A major part of this summer's project was the measuring of the surface elevation (in relation to sea level). It is hoped that we will be able to produce a contour map of the ice shelf. This is one of the last unknown characteristics of the shelf and will be very useful in future planning of more detailed work.

With two airfields now on the McMurdo Ice Shelf, it is important that we know as much about its behaviour as possible.

With the assistance of John Lythgoe, I drilled a series of holes, up to 85 feet deep, along the "flow

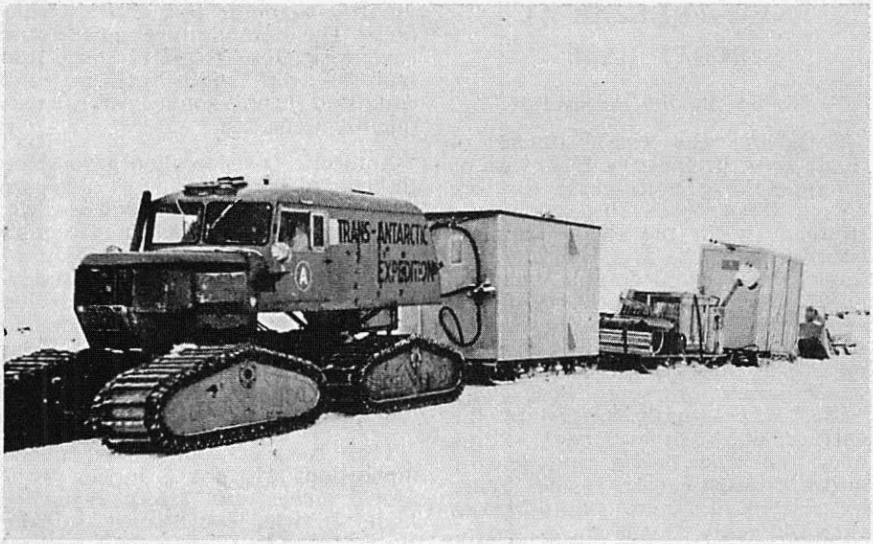

Photo: B. Procter

THE ICE-SHELF PROJECT TEAM ON THE MOVE.
OLD T.A.E. SNO-CAT TRANSPORTS TEAM TO ICE-SHELF

lines" of the shelf. Brine samples were obtained, and these should tell us something about any changes in the sea water as it infiltrates through the snow layers.

Bill Lucy and his team also remeasured accumulation markers along the Hut Point Peninsula-Terra Nova Saddle route (following the route used by Dave Lowe last year). They also climbed Erebus and made the first ascent of Terra Nova.

N.Z. ANTARCTIC SOCIETY

We regret that extreme pressure on space prevents the inclusion of information about the meetings of the very active local branches, Wellington and Canterbury.

POLAR CLUB

A Polar Club has been formed in Christchurch for those "who have lived inside the North or South Polar Circles, or in certain areas of the Sub-Polar regions, or who have made some meritorious contribution to Polar activities". It is hoped that the Club will complement the work of the Antarctic Society: many are members of both organisations.

SNO CAT RETIRES

The Sno Cat, used by the McMurdo Ice Shelf party, is due for retirement at some future date to a transport museum in New Zealand. It is the last serviceable Sno Cat used by Sir Vivian Fuchs on the Commonwealth Trans Antarctic expedition and still bears its original identificaton.

KIWI HERO FOR ANTARCTIC NOVEL

Popular British author Desmond Bagley has started research for an adventure novel about Antarctica which will feature a New Zealander as its hero. Mr. Bagley passed Wellington recently on his return from a visit to the Antarctic as a guest of the United States Information Service. He was so impressed by he hospitality accorded him at Scott Base that he is presenting a copy of each of his books (already published and, as he says "in perpetuity") to the Scott Base library.

NEW FREEZER AT SCOTT BASE

A freezer in the Antarctic!

Following the establishment of Scott Base in January 1957, various attempts have been made to store frozen fresh foods throughout the summer, when the shade temperatures get close to 32°F. For the first few years, a considerable quantity of the meats and almost all of the vegetables used at Scott Base were of the "tinned" variety. Frozen fresh meat was first stored in a "snow cave" south of Scott Base. This "cave" was actually formed by the cornice of a snow slope, folding over the tide crack, and leaving quite a large cavern inside. There have been numerous photos taken over the years, inside these "caves" and although carried away in the big breakout of 1965-66 they have now reformed, and are a considerable "tourist" attraction.

As more and more frozen fresh food was sent to Scott Base, there became a need for a more permanent food storage cave. This was dug out at the base of the "Ski slope" to the south-west of Pram Point, about a quarter of a mile from Scott Base. As the cave entrance (which had a door, to prevent the entry of any stray dogs) drifted over during the winter, the new Base party extended out the cave. By 1965, the food cave would have been about 50 feet in length.

In January 1966, it became evident that there could be a sea ice breakout up to the Pram Point shore line, and a new cave was hurriedly constructed in a snow slope north of Scott Base. The breakout eventually took away the snow cliffs surrounding the old cave, and the move to a new site was obviously made only just in time.

Unfortunately, the snow fall at the new site is not great, and this, coupled with the fact that it is sheltered from the south and becomes very warm during the summer months, made it not entirely suitable. The temperature inside the cave rose close to 32°F, much too high to keep frozen food in good condition, and some was consequently unusable.

Antarctic Division then gave some thought to the provision of a freezer unit, for correct frozen food storage. Incidentally, large, outdoor freezers have been used at N.A.F. McMurdo for many years. Consequently, a new freezer was built this summer inside the hangar at Scott Base. The inside temperature of the hangar seldom rises higher than 25°F and there are also considerable advantages in having the freezer under cover.

The freezer room has inside dimensions 11 foot 2 inches by 7 foot 3 inches, and 7 foot 21 inches high. It was constructed by the Base carpenter, Trevor O'Reilly, and fabricated from plywood with insulation of 4 inch polystrene. The freezer unit is mounted in the ceiling of the room.

It is hoped that a temperature of about 0°F can be maintained throughout the summer period, that is, during December and January. For the remainder of the year, the temperature inside the hangar should vary from this figure down to about —40°F.

With the provision of this new freezer unit, it is hoped to maintain a great variety of frozen fresh meats and vegetables in perfect condition throughout the year. It is also much more convenient to have the supplies close at hand and readily available throughout the winter.

Mike Prebble, ex-Scott Base Leader, is back in New Zealand after over a year's study overseas which included research at the Scott Polar Research Institute. In November he lectured at Bristol University and at Birmingham University on New Zealand's research in the Antarctic.

Developments At Dumont d'Urville

A 46-man party left France on November 28 by air for Hobart, on the first leg of their journey to Adélie Land; 26 are to winter in the Antarctic as "TA 18"; the remainder will help with unloading supplies and in construction work. The principal scientific studies will be in the fields of cosmic radiation and seismic and weather phenomena.

Meanwhile the Danish polar vessel "Thala Dan" (captain: H. Nielsen) reached Hobart direct from Le Havre, France (which she left on October 11), via the Panama Canal on November 28, loaded fresh provisions and took on a year's stores and supplies for Dumont d'Urville Base — including about 800 gallons of claret in 25-gallon kegs. The men who travelled by air arrived at Hobart on November 29. Leader of the wintering party is Fernand d'Amato (27). M. Paul-Emile Victor arrived by air on December 2.

"Thala Dan" sailed for the Antarctic on December 2 carrying a helicopter and two small motor boats.

Radio-operator on "Thala Dan" is Madame Inger Knudsen: her husband is the first assistant engineer.

Among the crew are two young Greenlanders, Kunungusk Fleischer, a 21-year-old apprentice seaman, and Simon Napatok, a 17-year-old deck-boy.

"Thala Dan" was due to return to Melbourne on New Year's Day to take Australian replacements to Wilkes Station, and to call again at Hobart in March.

With the mean temperature oscillating between −13.1°C. and −6.3°C., mean wind speed of 45 km./h., forced up by tempests to a maximum of 225 km./h., the break-up of the ice began on October 29; but although the sea proper was free of ice from that date, the ice remained trapped in the islands of the archipelago, as far as the edge of the usual mooring area for the relief ship late in November.

During the last quarter of 1967, T.A. XVII put the final touches on the new living quarters and began work on the repairs to the old buildings, painting, etc.

T.A. XVIII and the summer party arrived on "Thala Dan" on December 10. Unloading went without a hitch in fine weather. There was only one "incident" — two weasels unloading propane bottles encountered an area of rotten ice and sank. No-one was injured, no propane was lost, and finally the two weasels were recovered.

"Thala Dan" left Dumont d'Urville on December 20 for Cape Dennison where a biological programme was being carried out. Returning on the 23rd the ship left for Melbourne on the 24th.

Work then proceeded normally. The sea-water distillation plant was quickly in operation and the foundations of the CEA/RAYCO building and of the new winter-party sleeping quarters for 36 men were soon completed.

The scientific programme comprises work in geomagnetism, seismology, meteorology, aurora and night sky, ionosphere, cosmic rays, radio-activity, animal and human biology. Included in the summer programme was an aerial photographic coverage by helicopter of the Astrolabe Glacier.

Among the scheduled activities for the summer party, apart from the usual scientific work, were the construction of a laboratory for the study of cosmic rays and radio activity, and of the metal framework for future winter quarters, the installation of a sixth oil tank of 50 cubic metres capacity, and of a fourth 170 kva generator and extensive laying of electric cables.

DRINKING WATER FROM THE SEA

(See earlier description in our March 1967 issue, p. 460.)

The problem of supplying Base Dumont d'Urville with water set a difficult problem in view of the very

small reserves of snow not soiled by penguins. Only a sea-water desalination plant could solve the problem, and in view of the danger of freezing and low power sources a special unit had to be designed. Importation of gas-oil was out of the question. A heat-recovering process was therefore necessary, and the cooling water circuit of the electric power station diesels was used for the purpose.

The seawater, which arrives at the intake of the electric power station at about 2°C. is first of all heated in the recovery unit by the hot brine from the evaporator. Subsequently, the heated sea-water flows in turn through the nest of tubes of the two condenser stages, thus receiving additional calories through condensation of the steam. Only when it arrives at the main heat exchanger is the water given heat energy from an external source — the cooling water of the diesel generator sets of the power station. Thus pre-heated, the seawater is fed into the first vessel and subjected to the vacuum corresponding to the extraction temperature. Partial evaporation takes place in this initial vessel and the steam condenses in a condenser at the top. The remaining brine goes on to vessel No. 2, subjected to a higher vacuum, corresponding to a temperature of 40°C.

A vacuum extraction pump sends the hot brine at 40°C. into the recovery unit, from which it emerges at 12°C, to be discharged back to sea via discharge piping. Two discharge pipes are provided: the first, concentric with sea-water inlet pipe, discharges towards the pumping station to provide protection against freezing up of the cold sea-water inlet circuit, and the second discharges the waste water.

The pumping set, which is completely housed in a special building, lies on the shore. Submerged pumps could not be installed because of the thicknesses of ice that form in the winter.

(Adapted from French Technical Bulletin published by the French Embassy in New Zealand.)

SOUTH AFRICA

The Antarctic Medal of the South African Antarctic Association (donated by British Petroleum (S.A.)) for services to Antarctic research was awarded last year to

DR. DOUG TORR

at present Research Officer with the National Institute for Telecommunication Research, Johannesburg. Dr. Torr went to SANAE as the scientist responsible for the ionospheric programme of Rhodes University. This programme, says the citation, was carried out enthusiastically and with great care and devotion. Later he was largely responsible for solving the puzzling ionospheric riddle he had himself detected, with results of world-wide importance in the field of radio communication. His Ph.D. thesis was the first based on scientific work done at South Africa's Antarctic base. He was also a member of the 1963 team: the impressive list of his work and achievements ends with the unexpected note: "He proved to be one of the best and most original cooks of the expedition."

WANDERING KIWI

The guest speaker at the Annual Dinner of the Antarctic Association, where the medal was presented to Dr. Torr, was Professor Lester King of the Department of Geology, University of Natal. Prof. King began his address:

"I have been preparing this address for a long time. In fact I have been preparing it since 1910, when at a place called Lyttelton, New Zealand, I then watched a black ship leaving for Antarctica. It was Captain Scott's 'Terra Nova'. I wanted to go too, but had to wait 50 years before I stood at the South Pole."

In his address, which dealt largely with the resemblances between South African and Antarctic rock systems, the significance of this in connection with the theory of Continental Drift, and the part played by South African geologists in this research, Prof. King paid this tribute to a New Zealand field party geologist in connection with the search

BELGIANS AND SOUTH AFRICANS IN JOINT SUMMER PROGRAMME

Although Base Roi Baudouin remains temporarily closed, Belgian Antarctic activities continue. The "Comité Antarctique Belge" (chairman Baron G. de Gerlache) has organised a summer campaign with the South African Expeditions. Both Belgian and South African scientists will participate in the programme which mainly emphasises geological and glaciological research and also photogrammetry, south of SANAE.

COLLABORATION

After three purely Belgian Antarctic expeditions from 1958 to 1960, Belgium since 1964 has worked in collaboration with other countries, with Holland first of all in three Belgian-Dutch expeditions from 1964 to 1966, and now with South Africa. This bi-lateral collaboration is appreciated in full by the other countries engaged in Antarctic work. It has recently been cited as an example, both in the House of Commons and in the Lords during a debate on the ratification of the Antarctic Treaty by Great Britain.

In addition to team-leader T. van Autenboer, the other members are Commandant R. Arnhem and Sous-off. F. Beyens of the light aircraft division of the Belgian Army, Capt. R. Fagnal, V. Daniels and photographer J. P. Deruyck of the Air Force, geologist W. Loy, glaciologist H. Decleir and topographer J. J. Derwael. A majority of the team have already taken part in Belgian or Belgian-Dutch expeditions.

Extensive use will be made of the aircraft (Cessna 180 and de Havilland Otter) furnished by Belgium. They will be flown and maintained by a Belgian crew.

All equipment, including the two aircraft, left Belgium by cargo ship for Cape Town, where it was loaded on board the South African m.v. "RSA". The Belgian personnel, five airmen and four scientists, flew from Belgium to South Africa and boarded the "RSA". The scientific team comprises two geologists, a glaciologist and a topographer.

The "RSA" left Cape Town on December 29. The duration of the campaign in the field was expected to be four or five weeks and the expedition is due to return to Cape Town on March 1. It was planned to fly the two aircraft back from Cape Town to Belgium.

The Otter can carry a ton of cargo or eight men, and the Cessna is specially equipped for photogrammetry.

MOUNTAIN COUNTRY

The operation zone is a mountainous region situated 400 km. south of the base, SANAE, which is situated on the coast 900 km. west of the Belgian Roi Baudouin base. SANAE was previously, from 1957 to 1960, a Norwegian base.

The Belgian and South African teams will be put in with their stores and equipment, and re-supplied in the mountains, by the Otter plane. Transport in the field will be by small tracked vehicles and dog teams. These dogs were formerly the Base Roi Baudouin dogs which were given to the South Africans who had come to look for them in February 1967 at the Belgian base before it was closed down.

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for certain significant fossils which might occur "on the 14,000 ft. Mount Kirkpatrick, right at the head of the Beardmore Glacier . . . it is a forbidding place. G. W. Grindley has done magnificent work there but found no fossils."

PROGRAMME

Geology in the Sverdrupfjella-Gjelrikfjella region: study of metamorphic and igneous rocks.

Julotoppene and Forstefjell regions: reconnaissance in collaboration with South Africa.

Collection of palaeomagnetic and geochronological specimens.

Glaciology. Measurement of ice movement and thickness (gravimetry). Collaboration with South Africa in Jutulstraumen Nord and Viddalen. Collection of samples for stable isotopes.

Photogrammetry. Coastal photography (vertical) in the Trolltunga mountain areas, Sverdrupfjella and Gjelsvikfjella (vertical): Jutulstraumen (establishment of relative coordinates of the glaciological markers).

Cartography (in co-operation with South Africa): coast and mountain regions.

IN THE FIELD

The "RSA" reached the coast north of SANAE on January 17. Ice in the bay insufficiently solid for vehicles to cross made disembarkation difficult. After reconnaissance it was decided to use Muskeg Bay.

The Cessna was test flown on the 18th. The South African 1967 wintering-over party came out to the ship with dog-teams. The Otter made its trial flight on the 19th.

ALL SET TO GO

Up to January 20 bad weather limited the use of the aircraft to the environs of the bay and of the base. The Belgians found the South African base to be of similar construction to their own Base Roi Baudouin — but buried under 10 metres of snow. Little could be done because of continuing bad weather for several days. Temperatures were high but there was continuous blizzard with winds up to 130 km. per hour. Tents and bedding were soaked. But on the 25th the aircraft and stores were dug out and a local Cessna flight was made. Then Beyers and Van Autenboer were flown out. Loy and a South African radio operator were put down at Sverdrupfjella which had been selected as base site. The task of transporting material into the mountains now began.

On the 29th in a 12-hour working day the South African transport reached the mountains and established a depot. Bad weather closed in again on the 30th and 31st, but by February 3 the whole team was afield, air-photography was begun, and the topographers had started work. The weather was now first class and it was hoped to put back the departure date to February 20. The "RSA" had moved to Otter Bay. Pack ice had closed in to the north.

LATEST NEWS

February 10. More bad weather for five days — but "everybody OK".

GNAT IMPRESSES

A New Zealand-built Gnat made such an impression on a B.B.C. television team, when they visited Vanda Station recently, that several sequences were filmed on the vehicle. The team, who keep up with technological progress and innovations for their "Tomorrow's World" scientific documentaries, had never seen a Gnat or anything like it before. It was hoped to film other New Zealand scientific activities but an unscheduled delay at Byrd Station prevented this. The film was due for telecasting over all networks of the B.B.C. in December.

THE GNAT

AUSTRALIAN ANTARCTIC ACTIVITIES

The establishment of a small wintering-over station on the Amery Ice Shelf introduces a fresh note into Australia's Antarctic work. Meanwhile the 1967 parties carried out a most energetic programme right up to the moment of relief in late January.

AT MAWSON

At the end of November eleven men in five different groups were in the field with all the over-snow vehicles and both dog teams. One group with two dog teams headed towards Depot A to take a replacement part for the portable generating set which powers the depot's micropulsation equipment. The party left at six o'clock one fine Antarctic morning, and several climbed the first two miles of the iceslopes with them, watching the teams disappear among the rolling hills of snow. The party climbed 5,000 ft. on to the ice plateau and by the end of November were 50 miles out from Mawson pinned down in their tent by a blizzard 20 miles short of Depot A.

Kerr and Lockhart were in a snug caravan at Depot A surrounded by snow as far as one could see in all directions, the only feature being a great crevassed ridge of ice beyond them. They had plenty of supplies but were out of battery power for their micropulsation equipment. Lockhart's meteorology observations which were transmitted to all Antarctic bases ceased owing to lack of battery power for the radio, and they both had to await the relief party's arrival to get the equipment working again.

Little and Thomas sat out the blizzard in a tent near Depot Peak, 150 miles south, where they were observing Stinear Nunataks, 50 miles further south. These two parties each had a snowtrac and sledge.

Butler and Jackson were driving the now empty tractor train back to Depot B and Depot A. On the way out three crawler tractors were pulling maximum loads as their flying tracks hurled snow aside on the long haul from Depot A to Depot B.

All parties in the field had radios, essential for contacting each other in tellurometer survey work. The whole programme was impeded by shocking weather, but 90 drums of fuel were established at the main depot for next year's work at the Amery Ice Shelf and Prince Charles Mountains.

Moonie and Erskine made a trip with the dogs to get seal meat for the dog teams. The sea ice was becoming thin with icefloes moving up and down with the swell.

CO-OPERATION

The meteorologists had very long hours of work with the Russians needing hourly meteorological observations for their aircraft operations.

The chess game with the Russians at Mirny was nearing the end, and the first mistake by either side would finish the contest; Mawson won their game against the South African Base, Sanae.

The new pipeline worked for the first time on December 10, bringing water to the kitchen from a melt lake below the ice. It saves the daily chore of all carrying snow and makes an enormous difference to life at the camp.

All the above field members of the big spring expedition to the interior returned to base just before New Year, having achieved all their objectives. The men were bronzed and

weather beaten, with long hair and untrimmed beards. Not much washing or clothes-changing was possible during the eight weeks away. It was a most successful trip.

Two spent Christmas Day in a tent on Mount Twintops, while completing a survey project from Depot Peak, 150 miles inland, back to the Framnes Mountains. Two others spent Christmas in a small fibreglass caravan making gravity measurements and meteorological observations. The other four were in a tractor train at an established depot on the icecap.

Wood's party, which tried to reach Depot A with dog teams in order to mend the generator, were pinned down by constant blizzard twenty miles short of their destination, and as they were running short of dog food they decided to come back with the first break in the weather. They had a good run home riding the dog sleds most of the way down hill. The next day a 90 m.p.h. wind blew up.

SUMMER FINALE

In early January the last trip for the year, with a party under Erskine, left with fuel for Depot B, 140 miles inland, taking two tractors with sledges.

By New Year the sea ice had gone — the 90-mile wind in mid-December blew it all away.

An enjoyable Christmas was spent at base, even though eight men were away.

Just before the arrival of "Nella Dan" with the relief party, the last of the sea-ice finally surrendered to the wind and the waves and was soon lying broken against the west arm of our rocky little harbour.

On the second trip to Depot B, Erskine's party expected an easy run as their vehicles were not heavily loaded, but deep snow, unusual even for January, bogged the tractors so that it was necessary to pull one sledge at a time with the two tractors in tandem while struggling up the steep slopes. The tractors would then return for the rest of the load and in this way slow progress was made with two days being taken to travel through the Gap between Mount Coates and Mount Horden, an area notorious for its crevasses. It was in the Gap that a tractor broke through a concealed crevasse but was soon pulled out. As they faced another ten miles up steep snow slopes to Mount Twintop, it was finally decided to discard non-essential items, including a heater, the workshop caravan and some food. Both tractors and the rest of the train were hitched together and so they continued, still toiling slower than man walks but at least getting somewhere. After Twintop no rocks relieved the landscape, only snow and Depot A, just a spot on a blank map. From Depot A onward the men took turns huddled in the cold on top of the train spotting the route ahead with field glasses. On the return trip blizzards held up the party.

A survey party under Manning left camp to erect a survey beacon on the Anniversary Nunataks and measure tellurometer lines from McNair Nunatak to Onley Hill. Vehicle troubles twice forced a return to base, but all worked on the repair and they immediately left again. The party then worked straight through for two days without sleep to complete all the survey work, and after a good long sleep returned to the base.

Five men went for a swim in the harbour. Although it was very cold they said they felt as if they could have stayed for twenty minutes. Others are not so sure. Dent tried to play with the seals in the water, but the seals wouldn't co-operate.

COSMIC OR ASTRONOMIC?

Reilly has calculated at one million digits the incredible volume of data which has poured from his cosmic ray machinery, and he has made 70,000 separate computations!

PRINCE CHARLES INVITED TO MAWSON

At the time of the departure of the "Nella Dan" for Mawson, the Melbourne "Sun" ran an item indicating that the leader at Mawson for 1968, George Hamm, had written to Prince Charles inviting him to visit Mawson Station in the 1968–69 summer.

AT WILKES

The November report from Wilkes is a report of a quiet camp of 14 men, four working full time at the new station, "Repstat", while four more are in the field recording measurements by optical level from Wilkes to Cape Poinsett. Three further men form another field party using radio echo sounding equipment to record the rock profile beneath the icecap, following approximately the same route. A map on the mess wall records their movements, which up to November 22 were very slow due to severe blizzards restricting progress to 13 working days out of 35 days in the field. Since then, the weather has lived up to the name given to Wilkes — "Banana Coast" — and progress has now very much improved; however, chances of their return by Christmas were remote. No doubt they would be back in time to catch the "Thala Dan" whose progress is followed every day with a further map on the wall. The fact that both relief ships were now in Tasmania made us all realise they would soon be back in Australia. Most of the sea-ice had already disappeared.

Heavy snowfalls earlier in November, recording eight inches one day, make it seem impossible for the melt to reveal buildings and long forgotten objects, but each day the level receded, and pumps operated with increased frequency to remove meltwater under buildings and corridors.

The penguins already had two eggs each which should hatch round Christmas time. Skua gulls, which are the scavengers round the camp, also had laid near the penguin rookeries, the nearest being only half a mile away.

Early in November, four men made a dog-sledge trip to the edge of the Vanderford Glacier where a caravan provides food and shelter for weary travellers. They made a good journey there in just over eight hours, but then were forced to spend three days confined to the caravan in a blizzard after a panel of their Polar Pyramid tent blew out. All they saw was each other before returning in good time when the weather eased — so much for what should have been a pleasant break with a change of scenery!

When the field parties returned to Wilkes on New Year's Eve they had this to say:

"Both groups, although separate units, ended up travelling as a combined team. We were away for 74 days, which included 40 days of bad weather when work was not possible. The area we travelled was along a staked triangle and the countryside was a barren, featureless desert. The echo-sounding party attempted to travel over a new area but were stopped by deep snow, and it was found that 10 feet of snow had accumulated since autumn.

"Tarbuck cooked a very fine Christmas dinner, which was celebrated while a blizzard raged outside the caravan. We all enjoyed fine food and social talk over the radio with our mates back at Wilkes. Weir and Mitchell did excellent work in keeping the vehicles moving. Carter and Stickland, when not taking ice measurements, were kept busy with mathematical calculations necessary to ensure that accurate readings were being taken, and McGrath kept communications open with Wilkes. We all arrived at Wilkes about 8 p.m. on New Year's Eve, and the base wallahs let us join in festivities **after we had showered and put on fresh clothes."**

OVER TO O.-I.-C.

Meanwhile Leader Canham has this to say:

"At Wilkes with only 15 men we had a very busy month with continuing scientific programmes and constant maintenance to keep the camp running smoothly and meltwater at bay. The met. team, headed by Cleland, continued their monotonous task of daily balloon flights to record upper atmosphere conditions and meteorological observations every three hours."

One highlight of the month was another four-day dog trip to the caravan near Vanderford Glacier, 35 miles south of Wilkes. This was undertaken by Baggott, Hodges and Kelly, using one sledge and nine dogs. The purpose was to do some much needed repair work on the caravan and to restock with food, etc., for future parties.

ALWAYS THAT CREVASSE

Their trip was a great success spiced with no small amount of adventure on the outward journey. They decided to take along one of Mukluk's six-month-old pups, "Chompers", for experience. Nearing the caravan the party suddenly realised they were closer to the coast than they should be, discovering to their horror that they were in a heavily crevassed area. Somehow Chompers slipped his harness and the next second disappeared down a crevasse. Looking down he could not be seen, but cries were faintly heard. A council of war was held and it was decided to look for him as they had all emergency gear for such an eventuality. Crevasse ladders were rigged using the laden sledge as an anchor and Hodges descended to the unknown. At the bottom of the ladders some 45 ft. down he could see Chompers lodged in some snow in a bend in the crevasse right way up some 20 ft. further down, bawling his head off. He returned to the surface, ropes were hurriedly rigged and he went down again, being lowered the rest of the way. After much difficulty he succeeded in improvising a sling round a thoroughly frightened Chompers and both were hauled to the surface safe and sound.

Soon after the accomplishment of their task, deteriorating weather conditions made further use of the helicopters impossible. The aircraft carried out 18 flights in a shuttle service over a distance of 80 miles of which 35 were over pack ice and 45 over open water.

The 1967 Wilkes party were found to be in fine fettle and their station exceptionally well maintained. In addition, the replacement station still under construction was ready for further work as soon as the other ANARE vessel, "Thala Dan", arrived with the 1968 party and the necessary building material. "Nella Dan" advised "Thala Dan" by radio of ice conditions to assist her over the last stage of her journey to Wilkes.

"Thala Dan" had arrived at Wilkes by January 24 and unloading operations went into full swing at this station. She arrived after the departure of the "Nella Dan" for Mawson Station to the west.

ALONG THE COAST

"Nella Dan" herself has reported that a helicopter had been flown 30 miles from the ship, stationed at the edge of the pack ice, to Bowman Island, near the coast. Here a surveyor successfully carried out an astrofix and a geophysicist made magnetic measurements.

On January 23, survey parties from the "Nella Dan" were landed further along the coast in the Larsemann Hills and at Mount Caroline Mikkelsen where astrofixes were made and tellurometer survey lines were measured. The ship then prepared to move across to Sandefjord Bay to reconnoitre the front of the Amery Ice Shelf. The leader on the "Nella Dan" stated that this bay was fairly open, despite the presence of floating ice and many icebergs originating from the glacier-fed ice shelf.

SHIPS LEAVE

Back in Melbourne the usual franic activity surrounded the departure of relief parties.

The icebreaker "Nella Dan" left Melbourne on January 5, 1968, carrying the ANARE party to relieve the base at Mawson, and the special four-man party which will be put ashore on the Amery Ice Shelf for the 1968 winter.

The icebreaker "Thala Dan" left Melbourne on January 8, carrying the ANARE party to relieve Wilkes.

"NELLA DAN" NEARS WILKES

By January 16 after a 10-day voyage through rough seas, "Nella Dan" reached the northern edge of the pack ice, 80 miles from Wilkes. The pack ice was a little more extensive than last year but the floes smaller and not so closely packed. (Both Australian Antarctic expedition ships encountered severe difficulties in this area last season, "Thala Dan" eventually requiring the assistance of the United States icebreaker "Eastwind" to relieve Wilkes.)

The leader of the ship, Don Styles, held the ship in that position so as to ensure that its commitments fur-

ther west would be met. These included the landing of the party which is to study the Amery Ice Shelf, and the new team which is to relieve the 1967 party at Mawson Station.

AIRLIFT OPERATION

By January 23 "Nella Dan" was heading west for the Amery Ice Shelf and Mawson Station after a successful airlift operation from the ship to Wilkes Station, where 10 bags of mail and three tons of fresh and frozen food were landed. These stores are required by the 1968 party and by men engaged on construction of the station which is to replace the present one in 1969.

STATION ESTABLISHED ON AMERY ICE SHELF

The Amery Ice Shelf Glaciological Research Station has now been well established with over 40 tons of material including tractors, caravans, toboggans, sledges, 60 drums of fuel and other stores. The stores have been deposited in a large roofed pit dug in the ice. This considerable achievement provides an excellent start for the four-man party which is to be stationed on the shelf for the next 12 months.

The "Nella Dan" first reached this area on January 24. After spending two days reconnoitring, aided by helicopters, "Nella Dan" nosed carefully into the uncharted waters of Sandefjord Bay which was choked with icebergs. The whole of the 153-mile front of the Amery Ice Shelf was examined in detail and mapped by radar. The shelf was found to consist of an almost unbroken line of ice cliffs 130 ft. high, from which small icebergs occasionally were seen to crumble away as the helicopters passed over them.

It was quite impossible to land the Amery party's vehicles anywhere except at the southern extremity of Sandefjord Bay which is at the south-eastern end of the shelf and at latitude 69° 40′ S.

Another reconnaissance was made from a potential landing point to an area some 50 miles away towards the centre of the shelf where the party is to winter. This was to see whether a safe track could be found for the Nodwell oversnow vehicles, or whether they would be blocked by crevasses. Hundreds of large crevasses were found, but it seemed just practicable to choose a path through them.

ICE WHARF

Bad weather had hampered the ship's progress but when conditions improved, the ship's master, Captain Hansen, carefully felt his way into what came to be known as the ice wharf. Here the ship was skilfully held against current and swell while two 5-ton vehicles and 30 tons of other equipment, and stores, were unloaded on to the ice front, 10 to 15 ft. high at this point.

Unloading was completed in nine hours by three o'clock on Sunday morning, January 28. This was without incident except that several tons of ice were dislodged by the ship, and some fell on its deck.

As the ice wharf looked like breaking up and carrying the stores out to sea, they were rapidly moved inland to safety. During the next eight days, whenever the weather allowed it, the men and stores were moved to the wintering area by helicopter and tractor train.

The helicopters airlifted 24 tons of material and seven men to set up camp. The tractors probed a path with great care through the crevasses, which were completely concealed by a light snow cover. Poor visibility caused by wind-driven snow and whiteout conditions hampered the tractor train which took four and a half days to blaze the trail, while

helicopters helped in choosing the route. The return journey of 52 miles, however, only required 19 hours.

TO WINTER OVER

The wintering party at the new station comprises its leader Corry, glaciologist, Nichols, electronics engineer, Dr. Sansom, medical officer (from London), and Collins, senior diesel mechanic.

The survey work which commenced concurrently with this operation was done by three parties flown in by helicopter to several peaks. Rubeli, surveyor, and Vrana, physicist, have occupied Mount Caroline Mikkelsen for nearly a fortnight, seizing every favourable break in the weather to obtain a highly accurate astrofix and baseline for a survey which is to extend 100 miles down the eastern side of the Amery Ice Shelf. Ham, the new offer-in-charge of Mawson, and Blundell, radio officer, have occupied two other peaks, while Yeager, American observer from Washington, and Smith, geophysicist, have been stationed on two others. The last two parties were engaged on survey work, magnetic observations and glaciological collection.

PARTY RETURN

"Thala Dan" having carried out the relief operation at Wilkes and much of the summer building programme for the replacement station, was reported on February 12 as having returned to Australia with the 1967 wintering party.

CHANGE COMING IN ADMINISTRATION ?

A report, submitted to the Australian External Affairs Department by the Australian Academy of Science, is understood to contain suggestions which could determine the scope, control and leadership of Australian research in Antarctica, says a commentator in a leading newspaper.

One of the main questions is believed to be whether the Australian National Antarctic Research Expeditions (ANARE) should continued to be administered by the Department of External Affairs through its Antarctic Division.

ANARE has been under the wing of External Affairs since 1947. A possible alternative is that it should come under the control of a scientific body — the CSIRO, for example.

It is understood the External Affairs Department will make recommendations to the Federal Government within four months on the Academy's report and other reports on the Antarctic Division.

The Academy's report is understood to discuss whether the Antarctic Division should continue to take an active part in scientific research or whether it should limit its activity to logistic support for outside researchers.

It is said that the Public Service Board and the Treasury have questioned the Division's right to be involved in scientific research, and that the Board has turned down requests for more permanent scientific officers.

Any Government decision on this would not affect the Division's current expeditions.

If the Government decides the Antarctic Division should give up its own research programmes, the Division would most likely expand its role of financing research initiated and carried out by independent bodies such as universities.

The Division currently has a budget of slightly more than $2 million.

Most ANARE research is already conducted by Government organisations and universities. The Division initiates much of its own research and also co-ordinates much of the external research, providing continuity between the annual research expeditions.

The Australian Academy of Science maintains a close interest in the whole research programme.

A committee of eight fellows of the Academy conducted interviews with Antarctic authorities over the past year. The Academy has recommended its report be made public.

VOLCANIC ERUPTION COMPELS EVACUATION OF THREE BASES ON DECEPTION ISLAND

As briefly reported in our December issue, a terrifying and disastrous eruption on Deception Island (north-west of the tip of the Antarctica Peninsula and south of Cape Horn) on December 4-5 last year, forced fifty-two British, Argentine and Chilean men to flee for safety under a hail of rocks and ashes.

Sulphurous hot springs have been observed on the island since the early days of sealing and have at times been widespread. Kendall† in 1829 observed, " . . . at least one hundred and fifty holes, from which steam was issuing with a loud hissing noise", and Johnson* in 1839 reported " . . . several small craters, of three to four feet in diameter. From these a heated vapour is constantly issuing, accompanied by much noise." Three years later, Smiley* stated that " . . .the whole southern side of Deception Island appeared as if on fire" and he " . . . counted thirteen volcanoes in action".

After this the island appears to have remained more or less dormant until 1921 when the shore in the vicinity of the whaling station suddenly subsided, threatening the safety of the factory ship "Ronald", and the water boiled in the bay, taking the paint off all the ships. In January 1930, there was an earthquake during which part of the harbour floor dropped 15 ft. taking the end of a wharf with it, but since then the island has remained quiet, though there have been earth tremors and hot-springs activity has fluctuated.

Throughout the 1967 winter, earth tremors had increased in frequency and caused concern at all three bases on the island, the British at Whalers Bay in the south-east, the Chilean at Pendulum Cove in the north, and the Argentine at Fumarole Bay in the west. A seismograph at the Chilean base had recorded no fewer than 341 tremors in one month alone.

THE DRAMA UNROLLS

According to radio messages received from the British base, events on December 4 and 5 were as follows (all times are given in G.M.T. which is 4 hr. 2 min. ahead of local time):

2246: The Chilean base was called on radio but no reply.

2254: A very large cloud seen developing in the north of the island in the direction of the Chilean base. Two of the 14 men on base prepared to go over to the Chilean base by boat, two others intending to climb the hill (1,150 ft.) behind base to try to see what was happening, but by

2305: Ash falling heavily and visibility at times reduced to 30 yd., so neither party able to proceed.

2258: British base started to send radio calls for help.

2310: Ash falling, varying in size from coarse sand to very fine dust. Cumulo-nimbus cloud building up.

2330 onwards: Continuous thunder and lightning in volcanic cloud; static hindering radio communications.

0051 (December 5): Argentine Islands' base (British station), ans-

† Kendall, E. N. 1831. An account of the Island of Deception, One of the New Shetland Isles **J. Roy. Geogr. Soc. Lond.**, 1, No. 4, 62-66.

* In Wilkes, C. 1844. **Narrative of the United States Exploring Expedition, during the years 1838, 1839, 1840, 1841, 1842.** Vol. I. Philadelphia.

wered distress signals. Contact also made with Falkland Islands.

0100: Ready to evacuate base, if necessary, as unable to help Chileans. Ash combined with large hail falling heavily. Sky completely black and continuous heavy thunderstorm.

HELP COMING

0115: Received message that Chilean ship "Piloto Pardo" due to arrive at 0300 and intending to enter Port Foster (the inner harbour of Deception). Radio contact also with R.R.S. "Shackleton".

0139: Informed that Chileans had left their base and were on their way to the British base. This was the first news of the Chilean party and was received with great relief. (The Captain of the "Piloto Pardo" had seen a large explosion when six miles away and was afraid that all personnel might be lost.) No news of Argentine base.

0150: Amount of ash falling decreased and visibility increased, so possible to see for first time that water in bay rising and falling 5 ft. at intervals ranging from 30 sec. to 2 min.

0158: Asked "Piloto Pardo" if any news of Argentine personnel. Particular concern felt as one of their men had a broken leg.

0233: "Shackleton" radioed that estimated time of arrival about 1100 G.M.T.

0239: Informed "Pardo" that water still rising and falling rapidly and very strong current through Neptune's Bellows [the breach in the crater rim through which access is gained to the inner harbour; even in normal conditions navigation through the Bellows is hazardous], and that no news received of either the Chilean or Argentine parties.

CHILEANS SAFE

0249: The 27 Chileans arrived safely. The eruptions are centred only 1–1½ miles from their base; at least one large crater has opened up, and part of Telefon Ridge is thought to have disappeared. [One crater was later found to be only ¾ mile from the Chilean base!] They were extremely fortunate to have escaped unharmed, especially as the concrete basement in which they had taken refuge from falling stones had started to crack up. The journey by foot from their base must have been a nightmare experience as, at the time, the black pall completely covered the sky and vertical visibility was reduced to 50 ft., there was a constant rain of ash and hail, continuous thunder and lightning, and dust blowing. It had taken them two hours to cover the four miles.

0423: "Piloto Pardo" reported that Argentine personnel safe and that their ship the "Bahia Aguirre" was due to arrive within an hour. "Pardo" decided to postpone rescue attempts until the morning because of bad visibility. Radio contact maintained with ships and various stations.

0615: "Pardo" asked for report on weather and currents. Wind speed 0–15 kt. variable and sea normal for past hour.

0738: "Pardo" and "Yelcho" cruising south of Deception, waiting for improvement in weather.

1000: Water again rising and falling rapidly in inner harbour, and ships advised not to use small boats.

1024: "Pardo" sending helicopters in one hour, if possible.

EVACUATION

1204: Helicopters arrived and started evacuating personnel.

1250: Last men taken off base, which by then was covered by about a foot of ash and hail. Fresh eruptions observed while last flights being made, and later, from on board "Pardo", four distinct volcanic cloud columns seen rising above stratus and strato-cumulus.

The two Chilean ships then stood by while a helicopter from the "Bahia Aguirre" evacuated the Argentine party from the outer coast of the island.

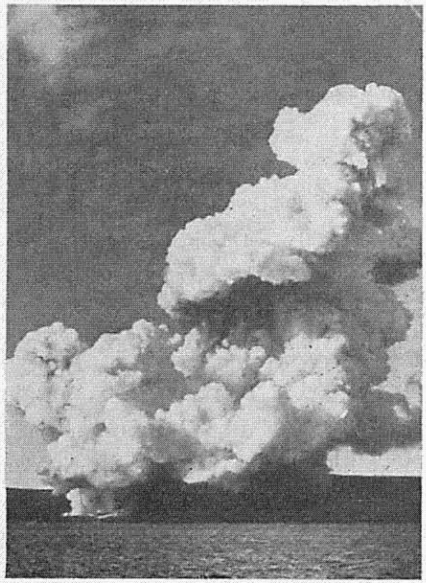
The British party were later transferred to the "Shackleton".

The last two taken from the British base were the commander, Cyril Myers, 24, and a radio operator who had maintained contact with the British radio station at Stanley, in the Falkland Islands, since midnight.

The rescue ships anchored outside

the island's horseshoe-shaped bay while helcopters started the shuttle rescue service. The ships did not enter the bay in case the narrow neck — made up of volcanic rock — collapsed and trapped them inside.

All 38 men — 30 Chileans and eight Britons — aboard the Chilean ship were said to be in good condition.



ERUPTION, DECEMBER 9, 1967
Copyright—British Antarctic Survey.
Photo: R. P. Vene.

Chilean reports said the "Piloto Pardo" made for the Chilean Arturo Pratt base, 38 miles west of the scene of the rescue at Conception Bay.

On the morning of December 7, a Chilean aircraft flew over the island and reported that the eruption cloud was reaching 30,000 ft., and that the centre of activity was under water at the northern end of the island. Later in the day the eruption seemed to have quietened down, although the main eruption centre was still sending clouds of steam up to 15,000 ft. at 4-minute intervals, with intermittent bursts of ash and rocks to about 3,000 ft. The "Shackleton" cautiously passed through Neptune's Bellows and entered Whalers Bay. A shore party collected personal belongings and aircraft spares, and retrieved drums of aviation fuel which had been scattered along the beach by the surging water. While they were there two distinct eruptions occurred, the ash rising to 17,000 ft.

NEW ISLAND FORMED

R.R.S. "John Biscoe" arrived at the island on December 15 carrying a geologist (M. H. Elliott) and a geomorphologist (C. M. Clapperton). A new island which had appeared in Telefon Bay was surveyed and found to consist entirely of ash and scoriae; it measures ¾ mile east–west, ½ mile north–south, and is 200 ft. high. It had been built up from three craters; a fourth vent had opened in the floor of an old crater near the Chilean station. All the craters were, by then, filled with water and steaming quietly. "Bombs", up to a foot across, were found some distance from the craters.

The British base was undamaged and covered by only about 2 inches of ash. It was left shuttered for the winter and will not be re-opened before the 1968–69 summer. The Chilean base was found to be intact apart from damage to the generator room roof, although it was covered by about a foot of ash. The Argentines are reported to have re-occupied their base at least for the summer.

A considerable amount of ash was found on Livingston Island (10 miles away) and some on Greenwich Island (40 miles away).

CHILEAN STORY

A Santiago (Chile) newspaper in a long report includes this vivid picture of the disaster from the point of view of the men at the Chilean base.

"The first explosion occurred at 1840 hr. (local time: 22.42 G.M.T.), and a large amount of smoke drifted across the base. Radio contact with the outside world could not be made as the power supply was cut, so the men took refuge in their underground concrete basement. Rocks were falling on the base and more explosions were felt. The first eruption seemed to be about five kilo-

metres away, and a later one was estimated to be at a distance of three kilometres. Power was restored and radio contact made with the ship "Yelcho". They evacuated the base at 2045 hr. and made for the British base, a sergeant acting as guide. The journey took two hours with the earth trembling beneath their feet.

"The chief features were violent underground noises, the water boiling in Port Foster, dense clouds of smoke and sulphurous fumes. The whole Dantesque spectacle was accompanied by explosions of such a force that they hurled vast quantities of hot volcanic rocks into the air. These began to fall dangerously close to the base, and the men had to retreat towards the British base at Whalers Bay.

"Here they spent Monday night (December 4) and the following day, when despite great difficulties Navy helicopters arrived from the 'Piloto Pardo' to evacuate the Chileans and English, whose lives were in serious danger."

The extraordinary upheaval was also observed from a low altitude by men on a DC-6 Chilean Air Force plane which made a three-hour flight over the island.

One eruption, they reported, rose from the sea within the old crater which forms Port Foster. Another 600 metres away, was at a point on the coast also inside the bay. Miraculously it seemed, the buildings of Pedro Aguirre Cerda base remained standing but all signs of life appeared to have been erased.

BRITISH ANTARCTIC SURVEY WIDESPREAD ACTIVITIES

HALLEY BAY

Throughout the winter internal construction has continued at the large new base built in January 1967. Twenty-four of the thirty-eight men occupied the new station, the remainder maintained the scientific programmes at the old base, and have moved across to the new base in the 1967–68 summer, as the scientific huts have been completed.

The 1968 wintering party totals 29.

The glaciological study of the Brunt Ice Shelf continues and numerous small parties have been travelling widely in connection with this work.

In early November a tractor and dog sledge party arrived at the Theron Mountains some 250 miles from Halley Bay. One group has completed the geological work of the last two seasons and repeated some necessary glaciological measurements. A second group set off up the Goldsmith Glacier with dog teams to reconnoitre a tractor route to the Fuchs Dome area in the Shackleton Range. Unable to cross the Slessor Glacier they travelled eastward until they could round the head of the glacier in 79° 26′ S., 15° 07′ W. The point finally reached was 80° 17′ S., 16° 10′ W., where the nearest rock lay some 14 miles distant. The shortest route from Halley Bay to the Shackletons has therefore been established as 450 miles, and future work in that area would entail a 900-mile round trip plus the distance travelled in the mountains. Operations at such extreme range without air support are difficult and ways of achieving the work are now being examined.

ANTARCTIC PENINSULA AREA

This year the aircraft flew south from the wintering station at Deception Island to Adelaide Island in August, a month earlier than usual. In spite of rather long periods of bad flying conditions Fossil Bluff station in George VI Sound has been resupplied and other depots in Palmer Land have been established.

The survey and geological parties were flown into the Palmer Land-Alexander Island area and have now resumed work on the projects which were necessarily abandoned through the loss of a plane two years ago.

The geological work is concen-

trated on the nunatak region along the length of western Palmer Land and at Ablation Valley in eastern Alexander Island. The surveyors are extending the tellurometer trilateration control scheme northwards along George VI Sound.

At the Argentine Islands observatory the existing geophysical programmes continue. A second non-magnetic hut has been built to house a proton vector magnetometer. This is a fibreglass-plastic structure similar to the laboratory and living quarters now provided at other British Antarctic Survey stations.

FORECASTING ICE CONDITIONS

Arrangements have been made to purchase, from the U.S. Department of Commerce-National Environmental Satellite Center, mosaic strip photographs taken by the satellite ESSA-3. These daily records are being used to provide information about ice conditions for the Survey's ships. The steady development of shore leads around the Weddell Sea and the Antarctic Peninsula were observed and finally it was possible to indicate a relatively clear route to Halley Bay for the "John Biscoe" and "Perla Dan" which was far from that usually followed.

RELIEF OPERATIONS

In December, the "Biscoe" relieved the Signy Island and Argentine Islands bases, and Deception Island was hastily evacuated by the Chilean ship "Piloto Pardo" when the eruptions occurred (see later).

Halley Bay was relieved by the "Biscoe" and "Perla Dan" in mid-January.

THE ACCIDENT AT HALLEY BAY

[We have received from the British Antarctic Survey these further details of the accident briefly related in our last issue.—Ed.]

On November 28, John Brotherhood and Jim Shirtcliffe were out on a one-day man-hauling trip from Halley Bay. They unfortunately encountered "white-out" conditions and fell 30 feet over an ice-cliff. Dr. Brotherhood received serious injuries to his back and face, but Shirtcliffe escaped with only a severely sprained ankle and was able to pitch a tent and make his companion comfortable. That evening the base sent out a search party which found and brought the two men back the following day.

The situation was especially difficult as John was the base Medical Officer, and though in considerable pain had to instruct his companions as to how to carry out a diagnosis of his injuries. X-ray pictures were taken and the Base Commander was in radio contact with the Medical Officer of Health in Stanley, Falkland Islands, who advised that efforts should be made to evacuate John as quickly as possible.

Since it was not possible for any British Antarctic Survey ship to bring him out to hospital before mid-January, Sir Vivian Fuchs contacted the National Science Foundation in Washington who most generously offered to seek assistance through the State Department and the U.S. Navy.

The Task Force Commander in Christchurch, New Zealand, immediately prepared two C-130s to fly to Halley Bay. The first took off at 0510 G.M.T.; the second two and a half hours later. They refuelled at the South Pole. Continual radio contact was kept with various American stations, and with Halley Bay, who gave hourly weather information. A runway 1¼ miles in length was marked out by oil drums, and one aircraft with a doctor on board landed at 0730 G.M.T.; the second aircraft remained in the air circling the base.

John was evacuated at 0905 G.M.T. and flown straight to McMurdo Sound, and then on to Burwood Hospital, Christchurch. He was found to have damaged two lumbar vertebrae and fractured facial bones, the latter necessitating plastic surgery, but he has now fully recovered and will be returning to the United Kingdom in March.

See report on page 37 on the **Radio-Echo Exploration of the Antarctic Ice Sheet,** a joint U.S. National Science Foundation, S.P.R.I. and B.A.S. enterprise.

Chilean Antarctic Programme For Coming Year

On November 20 the 23rd Chilean Antarctic task-force left Punta Arenas on the ships "Piloto Pardo" and "Yelcho". In command was Commodore Sr. Boris K. O'Neill.

In conformity with the policy of forwarding scientific research and technical development in Chilean Antarctic territory and in line with international agreements, I.N.A.C.H., the Chilean Antarctic Institute, initiates, supports and co-ordinates a comprehensive Antarctic programme carried out through various University and related scientific institutions.

During the current Antarctic season a group of 10 research men from the University of Chile and Concepcion sponsored by I.N.A.C.H. participated in and developed an extensive programme in such disciplines as Biology, Geology, Seismology and Telecommunications. The Chilean Meteorological Office and the Hydrographic Institute of the Navy carried out far-reaching studies in their own disciplines.

MARINE BIOLOGY

Doctors F. Buckle and R. Maturana of the **Montemar** Marine Biological Station extended the census of marine mammals being carried out in collaboration with I.N.A.C.H. The purpose was to evaluate the seal population of the Antarctic Peninsula and adjacent islands and to determine the possible annual deterioration brought about by the presence of man. This census has been carried out since the 1965–66 summer with the help of helicopters from the "Piloto Pardo". It is claimed that this is the first faunal inventory on such a large scale ever carried out in the Antarctic.

At the same time Dr. V. Gallardo and Sr. J. Castillo of Concepcion University will spend a month on "Yelcho" in order to make a systematic quantitative estimation of the benthic fauna existing in Bahia Chile and Estrecho Ingles, and at the same time to determine the characteristics of the ocean in order to carry out an exhaustive study of the benthic communities in these areas.

Sn. A. Boez of **Montemar** Marine Station aimed to collect 2,500 Antarctic fish in Bahia Chile and other pre-selected areas in order to analyse the stomach content and to carry out a global study of the reproductive cycle.

SOIL SCIENCE

The Institute of Hygiene and Animal Production of the University of Chile has been developing since 1964 an interesting programme of ecological studies of the mesofauna, at present concentrated on the environs of Copper Mine Refuge on Robert Island. At present Drs. R. Schlatter and E. Zeiss are studying the preferred food of Antarctic arthropods in various previously unstudied areas and at the same time are trying to determine the microclimatic characteristics of the environment.

GEOLOGY

Sns. E. Valenzuela, L. Chavey and F. Munyaga of the Geology Department of the University of Chile undertook a complete geological reconnaissance of Livingstone, Doumer, Wiencke and Stonington Islands, with special emphasis on the study of sedimentary tectonic sequences and crystalline basement respectively.

SEISMOLOGY

B. Blase and S. Soto of the Geophysics and Geodesy Departments of the University of Chile revised and calibrated the seismological instruments at O'Higgins and Arturo Prat Stations, and completed the construction of a modern seismological station at O'Higgins. This will begin functioning in 1969.

TELECOMMUNICATIONS

The Electricity Department of the University of Chile has been en-

U.S. GLACIOLOGISTS DRILL THROUGH THE ICE CAP

The United States project, described in our last issue, to drill to the rock beneath a mile and a half of ice, has been brought to a successful conclusion.

The Antarctic Ice Cap has been successfully penetrated for the first time, by scientists and engineers from the Cold Regions Research and Engineering Laboratory, surrendering continuous cores of nearly a mile and a half of ice, more than 99.7% of the footage drilled. The bottom ice is reported as being perhaps hundreds of thousands of years old.

January 29 brought the conclusion of the drilling project (see Antarctic, Vol. 4, No. 12 for earlier report), with 7,100 feet of ice at Byrd Station successfully drilled. Cores were obtained in 15 foot sections, representing ice from the snow surface to the base of the West Antarctic ice cap, and will on analysis provide a vertical profile of polar history. Already cores at depths of 4,370 and 4,627 feet show two layers tentatively identified as volcanic ash, in ice probably 10,000 to 14,000 years old. If conclusively identified as ash, the layers will then pose the problem of whether their deposition was a result of merely local volcanic activity or world-wide activity. Further evidence suggests that the last 18 feet of the cylinder ice is also composed of volcanic material.

More intensive studies of the cores will be carried out in laboratories in the United States and other countries, but preliminary analysis was effected on the site under the direction of CRREL glaciologist, New Zealander Anthony J. Gow, who has just completed his ninth season in the Antarctic.

Working a 24-hour day, the eight-man CRREL team averaged a depth of 100 feet a day, under the supervision of Herbert T. Ueda, a CRREL mechanical engineer. Drilling this season began at 740 feet and stopped 6,360 feet further down. The machinery itself was located in an ice tunnel 20 feet beneath the surface, while a 70 feet drill tower stood on the snow above. The density of the

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trusted by I.N.A.C.H. with the analysis of radio-propagation between Aguirre Cerda Base and the other Antarctic and southern hemisphere meteorological centres (McMurdo, Mirny and Melbourne) in order to facilitate the installation of a Regional Meteorological Centre at this base. For this purpose J. Serrat was invited by the National Science Foundation to visit McMurdo during November and was then flown from Punta Arenas to the Aguirre Cerda Base by the Chilean Air Force in order to study the terrain and to establish a permanent programme of tests of ionospheric propagation.

OTHER PROJECTS

A meteorologist and a technician reconditioned all the surface meteorological instruments at the three Chilean bases. A geomagnetist studied the terrain at various points in the Antarctic Peninsula and the adjacent islands in order to establish geomagnetic redirection points at the various bases and refuges so as to measure the annual variations in the earth's magnetic field.

The Navy's Hydrographic Institute undertook the complete mapping of the various islands in the South Shetland group.

Dr. Fernando Buckle was appointed Executive Co-ordinator for the season to ensure adequate logistical support for this extensive programme.

ice increased progressively with depth, as a result of the pressure of the ice above, and cores from 1,300 to 3,000 feet were very brittle and fractured. Below this depth, however, the ice became much softer. Numerous cloudy bands, up to half an inch thick, were found beyond 3,900 feet and were composed of much smaller crystals than those of the surrounding ice. They may be the result of ice shearing.

Small portions of the 15-foot cores will be sent to the United States, the remaining sections remaining, in carefully annotated plastic bags, in cold storage at Byrd Station, for study by scientists on request to the National Science Foundation.

At the mysterious bottom of the 4 in.-wide drill hole, the samples revealed dirty ice and gray and black rock. Fragments, up to 2½ inches across, appeared to be also volcanic material.

Water was reported at the point where ice met an apparent rock surface. Slippage of the ice from this surface has so far prevented scientists from obtaining a core of the underlying material. However cuttings obtained from this material will be analysed to determine the nature of the underlying rock.

NO MORE MAMMOTH TRAVERSES ?

What may turn out to be the last leg of the ground-based Queen Maud Land traverse left Plateau Station at the beginning of December under the leadership of Mr. N. W. Peddie of the U.S. Coast and Geodetic Survey. This is the third leg of the 5000-mile, four-year duration traverse from Amundsen-Scott Pole Station to Roi Baudouin base. The men, travelling in specially-equipped tractors, were due to be picked up about February 1 by a ski-equipped Hercules, and, during their traversing, experiments with aircraft-carried sensory devices will attempt to find out if the man on the ground can be made obsolete. (See page 37.) The traversers were scheduled to investigate ice thicknesses, the characteristics of the ice sheet and bedrock interfaces, snow accumulation, and meteorological, glaciological and magnetic fields. One of the party is a Norwegian exchange scientist, Mr. Y. Gjessing from Norsk Polarinstitutt.

Traverses (long range, long term treks by crawler-tractor caravans) may soon be things of the past. The National Science Foundation is to decide this year whether remote sensing devices carried on long-range aircraft can or cannot collect the same data as the ground-based men and machines, basing its decision on a comparison of sensor-collected measurements with those of the traverse party's sonar soundings, both made this year. If the two sets of measurements are equally reliable, the traverse system will be ended. Much will depend on the precision of the navigation. The experimental flights were made in conjunction with the Scott Polar Institute and the British Antarctic Survey, and if proved successful would supersede traverses both by the use of sensor devices and by their ability to make "hop, skip and jump" journeys to land scientists for the sampling of snow for ice-movement studies.

THE BEST YET?

The amount of work accomplished by the United States Navy Antarctic support force this season appeared to be the best ever achieved, the commander of the force (Rear-Admiral J. L. Abbot) said in Christchurch on February 21.

The reason for this, he said, was better weather in Antarctica.

Admiral Abbot said that the highlights included the completion of the third leg of a traverse across Queen Maud Land, extensive surveying by

United States Army turbine helicopters in Marie Byrd Land, the deep-drilling project at Byrd Station, the oceanographic survey in the Weddell Sea area by the icebreaker Glacier, and the airborne ice-thickness sensing programme conducted by the Scott Polar Research Institute of Cambridge, England.

This latter experiment had proved so successful that the National Science Foundation had decided not to continue the fourth and final leg of the traverse next year. Admiral Abbot said the airborne sensing programme was, in his view, the most exciting achievement of the season.

"The reason I say this is that if we continued with the old traverse method then we would never know in our lifetime what the Antarctic is like beneath the snow and ice. Once this new method had been refined and put into more extensive use it will mean that this knowledge will be available in our lifetime."

SUPPORT SERVICES

Support operations, provided by the U.S. Navy, have to cope with the emergencies as well as with the heavy load of routine matters. Twelve ships have been employed to keep Deep Freeze 68 operating smoothly, along with ten winged aircraft and four helicopters to relieve and supply the inland stations, to participate in scientific programmes such as aerial photography and photomapping, to give direct support to 37 scientific projects in the U.S. Antarctic Research Programme and to make investigatory flights with airborne sensing equipment (see Science Reports). A busy programme, yet when emergency called, the Navy was there, too. Physician at Halley Bay for the British Antarctic Survey, Dr. John Brotherhood, was himself in need of medical attention after he and a companion had fallen down a 30 ft. ice cliff, so urgently in need that aerial evacuation was deemed necessary and a U.S. Navy Hercules answered the call, to make the longest mercy flight in Antarctic history. (See report under U.K. bases section.)

BECOMING A HABIT

A new name, if not a new vessel, appeared in this season's icebreaker fleet in the Antarctic. U.S.C.G.S. "Southwind" has not been heard of before in Deep Freeze operations, despite the fact that she has been seen during six previous ones, under one of her other names, U.S.S. "Atka".

Name changing is a habit of the now-Southwind. During her 23 years she has been commissioned no fewer than five times, starting life as "Southwind" in 1944 as a Coast Guard cutter and serving briefly in Arctic waters as an escort and reconnaissance ship. In March 1945 she was lease-lent to the Soviet Navy and recommissioned as the "Admiral Makarov" after a famous Russian recognised as the father of the modern icebreaker. Some five years later the ship returned to the United States Navy, operating in Japan before re-basing in Boston where she was recommissioned again, this time as U.S.S. "Atka". This was in 1950. In 1966 "Atka" joined her sister icebreakers, turned over from the Navy to the Coast Guard and became not U.S.S. but U.S.C.G.S. "Atka". At the unanimous request of her crew she has now reverted to her original name and as "Southwind", now fitted with a telescopic hangar, again keeps company with "Northwind", "Eastwind" and "Westwind".

UNSCHEDULED

Yet another reversal in the role of a medical officer brought yet another mercy flight, in miniature, to a Support Force vessel when Dr. James J. Sherry, of the U.S.C.G.S. Glacier became ill soon after the ship left Lyttelton for Punta Arenas to join up with the Weddell Sea oceanographic expedition. (See science notes.)

Turning back for Lyttelton, Glacier sailed as far as Godley Head at the mouth of the harbour before flying Dr. Sherry off in her helicopter to the U.S. Antarctic expedition's advance base at Harewood. Glacier,

her helicopter back, though not her doctor, then sailed again for Punta Arenas.

Earlier in the season Glacier had again sailed from Lyttelton, this time plus a passenger, not minus a doctor. Her passenger was the captain (Captain O. L. Dawson)'s son, Stephen, a 16-year-old pupil of the Fountain Valley High School, California, who had been granted permission by the authorities to make the round trip.

For her Weddell Sea expedition, Glacier will carry 26 scientists, as well as laboratories for biological, geological, chemical, magnetic and seismic research. Three satellites now rotating in space will feed Glacier's computers with data to determine latitude and longitude.

Flying in the Antarctic, internally, externally, summer or winter, has become almost as routine as flying anywhere else in the world.

FLIGHTS

The McMurdo-South Pole flight is, to U.S. Navy Hercules pilots, "just a milk run", as familiarisation, better aircraft, and greatly improved weather forecasting have eliminated most of the one-time hazards. Mid-winter flights, once unheard of, then emergency-only, are now planned in advance, for routine purposes. Programme director for the National Science Foundation, Mr. P. M. Smith, said in Christchurch last month that two Hercules flights to the Antarctic would be made in August next, taking 11 scientists, and six men from Air Development Squadron 6 who will be able to start helicopter flights on a limited basis that month. Most scientists who want to winter in Antarctica, he said, were biologists.

PEOPLE

Soviet geologist, Mr. B. G. Lopatin of the Institute of Arctic Geology, has joined the U.S. Antarctic Research Programme for 1968–69. He was to participate in the Marie Byrd Land survey before wintering over at McMurdo.

THE SCIENTISTS SAY . . .

The space age and its satellites may well alter the whole machinery of Antarctic research and support. Traverses, picket ships, meteorologists, all scientists except biologists and geologists, could in the future be as remote to the Antarctic as are the conventional heroes of Antarctic exploration.

Long range planning is already geared towards the automation of routine data-taking, according to the National Science Foundation's director of environmental sciences, Dr. T. O. Jones. Movement was away from human effort and towards the collection of data by remote sensors which will be monitored from the United States by way of satellites.

First attempts are already under way to test this new method of research. The icebreaker "Glacier" was due to leave Chile on January 25 on a joint U.S., Norwegian and Argentinian oceanographic survey carrying automatic picture transmission equipment for the satellite photography of the sea ice, as well as satellite navigation equipment to be used in conjunction with current-metering devices that will be left on the sea-bed. These meters will measure the strength, direction and temperature of bottom currents — it is thought that the very cold bottom waters occurring in the world's oceans may originate in the Antarctic and flow as far north as the Equator, in much the same way as cold Antarctic air affects the world's weather.

One of the important things to ascertain, said the chief scientist for the U.S. National Science Foundation, Dr. Louis Quam, was how much welling to the surface of salts, nutrients and fertilisers from the rich Antarctic seas took place. As surface water freezes, some salt separates out and the remaining surface water becomes dense and sinks to the bottom, and then is carried north.

The Navy, too, has its eyes on satellites. The Commander of the U.S. Navy Antarctic support force (Rear-Admiral J. L. Abbot) warned Dunedin (N.Z.) that this may be the last time in which U.S. Navy ships use the Port of Otago as a base when on picket duty as, since the use of satellites to gain weather information was increasing and as no flights were now made to the Antarctic by twin-engined aircraft, the need for Dunedin-based picket ships was questionable.

Antarctic continental glaciation seems to have occurred some two million years earlier than elsewhere in either the northern or southern hemispheres. This is the conclusion to be drawn from the dating of rock samples collected in the Antarctic by N.S.F. geologists, which rocks show an age of 2.7 million years.

The samples were taken from cinder cones and lava flows resting on previously glaciated surfaces and glacial deposits in the Taylor Valley, one of the outstandingly informative ice-free valleys on the west coast of McMurdo Sound. This recent information ties in with the date given submarine cores collected by the "Eltanin" from the floor of the Pacific-Antarctic basin, which indicated the initiation of the Antarctic ice sheet having occurred some time more than 3 million years ago.

The rock specimens were collected by Drs. Richard L. Armstrong of the Department of Geology, Yale University; George H. Denton of the American Geographical Society and the Radiocarbon Laboratory, also of Yale University; and Warren Hamilton of the U.S. Geological Survey. They were then dated by the potassium-argon method at Yale University.

U.S.N.S. "Eltanin" has completed three more cruises since her re-fit last September, bringing the total number to 34. Recently released figures show that between February 27, 1962, and August 2, 1967, she had covered a total of 187,816 nautical miles during 1,526 days at sea. These days at sea comprised 80.1% of her time away from home.

Some might call them dedicated, some might call they crazy, all must agree that the allure of the Antarctic is nowhere better illustrated than in their case. Two graduates of the University of Washington spend their summers living in a small hut a mile and half out on the ice shelf and diving as deep as 100 ft. in waters from 25°, looking at 60 or more cages of marine life suspended under the ice. Their comment on their spartan activity? "It gets you — after a while."

Further nuclear power plants are improbable in the American bases in the Antarctic, according to the commander of U.S. Navy Antarctic support force, Rear-Admiral J. R. Abbott. Installation costs and later assessment of the value of the plants have resulted in the dropping of a plan to place nuclear power plants at Byrd and the Pole Stations. The McMurdo plant, apparently getting more and more dependable, will be maintained.

To familiarise field personnel of the U.S. Antarctic Research Programme, a five-day orientation session was held in Skyland, Virginia, last September. Similar meetings are arranged each year to give the men a background of the history of Antarctic exploration and research; subjects such as safety precautions, survival techniques, conservation and international co-operation are also covered and the field personnel get the opportunity to become acquainted with each other and with the senior administrative staff.

NEWS FROM UNITED STATES BASES

All U.S. inland bases and stations in Antarctica now have one thing in common — the time.

For the first time in Antarctic history, all the inland stations during the Deep Freeze 68 summer are operating on the same time as that of McMurdo, which will facilitate communications and co-ordination, and allow the E.T.A. of a flight from McMurdo to be calculated simply by adding flying hours on to departure time. No longer will travellers from McMurdo to, say, Byrd emulate the young lady called Bright by setting out after breakfast at Williams Field and arriving in time for supper the previous night.

Palmer and Hallett Stations have not been affected by the change, as Palmer has more contact with ships using South American ports than with aircraft from McMurdo and is therefore continuing to observe the time laid down by its geographic time zone. Hallett has been using McMurdo time anyway, although in a different zone, for easier communication with the Naval Support Force advance headquarters in Christchurch, N.Z.

McMURDO

Not only are there roads at McMurdo (one to Williams Field and the one being built to Scott Base) but also there are traffic lights and a parking meter. A joke — well, maybe, but it could become for real when allowances are made for the 24-hour per 24 hours flow of traffic plus the existence of three cinemas, four clubs, a newspaper, a radio station, a department store, garages, a bus service, laundries, a post office, a bakery, an ice-cream unit and a summer population of 2,000. Already road accidents — even if consisting largely of sprained ankles suffered by men jumping from trucks, aircraft, etc., onto the ice — are the cause of the most common casualty cases treated at McMurdo's hospital which deals with an average of 80 out-patients, including New Zealanders, daily.

During the early summer, 800-odd patients were treated at McMurdo. Sprained ankles and throat infections brought most patients, amongst whom has been a most unusual one—a dog (see story on p. 10). With eight beds and equipment to carry out quite major surgery the hospital could cope with most emergencies — though serious cases are sent back to Christchurch if immediate surgery is not essential. Frostbite and snow-blindness, which might be expected to rate as occupational hazards in the Antarctic, are practically unknown, thanks, it is thought, to the excellent training given Deep Freezers and others before their arrival.

The construction battalion unit at McMurdo has a full programme. The road to Scott Base is well away, due partly to the excellent co-operation given from the New Zealanders at Scott Base. The Station itself is scheduled for considerable redevelopment, with the replacement of obsolete facilities with new long-life buildings, for the next eight years. A new pier face at Elliot Quay in the Sound is also planned.

Church services, the festive board, films, a Rugby match versus Scott Base and several parties all helped to make Christmas at McMurdo this summer memorable. Ham radios brought home to the 540 men who talked with relatives in the U.S. on Christmas night.

BYRD

Construction plans for Byrd include the rehabilitation and extension of the garage tunnel, and a heat recovery system to recover wasted heat from the generators warming the station buildings; but the assistant chief of staff for naval engineering, Commander A. E. Church, warns that a complete replacement of Byrd, and of Amundsen-Scott South Pole, may be necessary in the next five years. The

present Byrd Station, itself an under-snow replacement for the other, snow-crushed Byrd some six miles away, suffers a continuing deformation of tunnel walls after heat from the inhabited side of the tunnels (the uninhabited or storage side of the walls are not affected) deforming the walls which in turn affect the structure of the arches above. A system of pumping cold air through the warping tunnels is being tried and should it prove ineffective, three years is the maximum safe life span for Byrd Station.

SOUTH POLE

This station, too, is likely to be rebuilt, the new size and positioning dependent on the requirements of the National Science Foundation's Antarctic research programme. Personnel wintering over at the Pole Station last winter were told that rebuilding plans had been made for two years' time, and Commander Church has said that it is intended to procure materials next season and put them up the one after. Although structurally the 10-year-old station could exist for many years, perhaps with some major renovations, scientists are not altogether satisfied with working conditions there.

HALLETT

Storms did considerable damage here last winter, though fortunately mostly to buildings scheduled for demolition anyway. Repairs where necessary have been planned.

PLATEAU

A year's practical experience at Plateau has persuaded a doctor that hardships at this remote station have been evaggerated. Personality conflicts are much more hazardous than possible physical damage, in the opinion of Lieutenant A. Blackburn, who was in command of Plateau for the last year. No serious medical problems arose, though a certain amount of dentistry was called for. Earlier acclimatisation at the South Pole station reduced altitude sickness to practically nothing and although a heavy blizzard had nearly delayed the first flight in this summer, temperatures had been, largely, mild.

Plateau Station will be closed next January, according to the director of environmental sciences for the National Science Foundation (Dr. T. O. Jones) in Christchurch last month. The station would, however, be left intact in case it was needed again.

PALMER

A 300-ton sailing ship is to be an integral part of Palmer Station, working with the shore station as a combined scientific facility. The 22-inch thick hulled "Hero" is to be named after the sealing sloop in which Nathaniel Palmer was (or was not, depending on which of the three national claims, British, Russian or American, is accepted) the first man to sight the Antarctic continent. She will be launched in March, to measure 125 ft. in length and carrying a mast and sail as well as twin diesel engines. The sail will permit "silent-ship work" by scientists studying porpoises, seals or other animals they do not wish to disturb.

EIGHTS

The first living visitors in this ghost town came to Eights at the end of January, when a ski-equipped Hercules was able to home in on the radio antennas left behind when Eights was closed more than two years ago. All that is now visible at Eights are four of these antennae and the top of a D-2 caterpillar, but an entrance to the station was found without trouble when the aircraft's captain fell through an aurora dome just below the surface of the snow. Some 10 ft. of snow buried the station itself, which has remained snow-free and clean apart from Marie Celeste-like reminders of the last occupants — coffee cups were half-filled, an ashtray proffered a

half-smoked cigarette, the shelves were still stocked, the garbage pail not empty; the generators were fuelled, the station log lay on the petty officer's desk, openly waiting his return. The last entry recorded the unexpectedly immediate arrival of the last plane before the station's closure at the end of the 1965 winter and apologised: "Going like hell to get finished. Received word just before lunch that 319 on its way. Busy sealing up stacks and vents. At 1730 there is still one transmitter to be boxed. Will take some time. 2000 — deserted camp due to low fuel on plane — sorry to leave place in such a mess — couldn't help it." And the hurried entry was signed C. R. Lyon, HMC.

This year's visit was to investigate conditions for the possible re-opening of the station, but there are no immediate plans for its revivication.

ANTARCTIC NUPTIALS

Our many New Zealand and other readers who know A. P. (Bert) Crary and especially those who knew Mildred Rodgers as a keen and lively member of the United States Antarctic team in Washington in I.G.Y. days will join us in hearty congratulations to them on their marriage in Washington on February 16. Bert, formerly Chief Scientist for the Office of Antarctic Programs, is now Deputy Director of the National Science Foundation's Division of Environmental Sciences. Mrs. Crary is editor of Science Information News, a bi-monthly publication of the Foundation.

POLAR ARCHIVES

A Center for Polar Archives has been opened by the National Archives, to serve as a repository for records created by U.S. Government agencies engaged in polar activities and for gifts of private papers relating to the Arctic and Antarctic. Plans have been made to compile a comprehensive list of explorations and primary research projects on polar regions, to prepare a polar bibliography and to publish a location list of polar manuscripts and related records.

Already deposited in the Center are papers concerning Admiral Robert E. Peary, Dr. Paul A. Siple and others, and these were displayed as an exhibit at the opening evening. Records traced the history of Antarctic discovery and exploration from Lieutenant Wilkes' U.S. expedition of 1838–42, through Byrd's expeditions up to today. Antarctic, as distinct from Arctic, exploration and research was the theme of the second morning's session of the opening conference, with chairman Rear Admiral J. Lloyd Abbott Jr., and papers presented by Dr. Henry M. Dater and Dr. A. P. Crary. Rear Admiral David M. Tyree chaired the afternoon session on the Antarctic.

DR. A. T. WATERMAN

Long-time Director of the National Science Foundation and leader in the fostering of basic research in the United States, Dr. Alan T. Waterman, died at 75 in Washington last November.

Antarctic research, in particular, owes much to Dr. Waterman. His judgment was decisive in the establishing of U.S. scientific programmes there during I.G.Y., and the consequent creation of the U.S. Antarctic Research Programme was also strongly advocated by Dr. Waterman.

A recipient of a Ph.D. at Princeton University in 1916, he pursued his interest in physics through many university positions and through two wars. Retirement merely reduced his work to an advisory capacity on many organisations, including National Aeronautics and Space Administration, and for his works he was awarded the Presidential Medal for Merit, the Presidential Medal of Freedom, the Captain Robert Dexter Conrad Award, the Public Welfare Medal and the Karl Comptom Award.

RADIO ECHO EXPLORATION OF THE ANTARCTIC ICE SHEET

[We are indebted to members of the U.S. National Science Foundation who at the request of the British Antarctic Survey have compiled for "Antarctic" this authoritative account of a research programme which promises far-reaching results.—Ed.]

A joint research programme has been arranged between the United States National Science Foundation, the Scott Polar Research Institute (SPRI) and the British Antarctic Survey (BAS) to undertake airborne radio echo sounding of ice depth over the whole area of Antarctica. The long range aircraft required for the task are being provided by the United States Navy Air Development Squadron Six. The Natural Environment Research Council of the United Kingdom has made available, through the SPRI and BAS, the funds required to purchase radio echo sounding equipment and associated apparatus, and salaries for development work and analysis. The scientific programme is directed from the SPRI by S. Evans, G. de Q. Robin, and C. W. W. Swithinbank, assisted at present by D. L. Petrie, Mrs. A. Fuzesy, and B. M. E. Smith.

A summer programme lasting three summer seasons in Antarctica is planned to give a much more extensive and detailed knowledge of sub-ice topography than has been possible by use of seismic shooting and gravity measurements. The first season's operations were planned initially as feasibility trials which would also collect as much data on ice thicknesses as practicable.

During November 1967, a U.S. Navy C-121J aircraft (Lockheed Super Constellation) under the command of Lt.-Cdr. J. K. Morrison was fitted out for the first season at Christchurch International Airport, New Zealand. The installation included two separate radio echo instruments of the SPRI Mark II type, with duplication of the 35 mm photographic recorders which have been found to be the least reliable part of the system. The aerials were terminated wire dipoles carried broadside to the line of flight between short pylons extending downwards from the vertical stabilizers and the fuselage. Correlation with the aircraft navigation system was provided by a SFIM flight recorder using 60 mm photographic paper which carried airspeed, pressure altitude, outside air temperature, heading, and terrain-clearance traces and the same time-marks and event-marks as the radio echo film.

On December 5, Robin, Swithinbank, and Smith left Christchurch for McMurdo Sound. During December a total of 94 hours was flown on radio echo missions. The longer flights were made with the principal purpose of discovering the practical limits of depth penetration for a wide range of ice temperature conditions. Longitudinal and transverse sections were made of several of the valley glaciers that feed the Ross Ice Shelf, and since weather sometimes precluded long inland flights, considerable attention was paid to the Ross Ice Shelf itself.

On land glaciers, bottom reflections were generally continuous where the ice depth was less than 2000 m but intermittent where the depth was greater than this. However, difficulties were experienced at times when recording bottom echoes from lesser depths in valley glaciers due to swamping of possible bottom

echoes by clutter from heavily crevassed surfaces and by echoes from valley sidewalls on narrow glaciers. Much greater depths were recorded in the cold high plateau areas where surface elevations exceed 3500 m than in the warmer ice near Byrd. The maximum depth measured was 4200 m near Sovetskaya. In Marie Byrd Land the ice bottom was just discernible as far as Byrd, where the ice depth is 2200 m, but no bottom reflections were recorded to the east of Byrd.

In areas where the echoes were weak a normal flying altitude of 300 m above terrain was used so that strong echoes from the ice surface and shallower horizons in the ice could be suppressed. The aircraft's radio altimeter was then used to record terrain clearance.

This arrangement, which is inconvenient in analysis, resulted from the extreme difference in strength (sometimes as great as 60 dB) of the echoes from the upper and lower surfaces of the ice. On the inland ice sheet, surprisingly strong echoes were observed from layers within the top 1400 m of ice. The layers were deeper and more extensive than had previously been reported and the interest in them is an additional incentive to improvement in the range of echo strength which can be recorded. On floating glaciers, bottom reflections were much stronger than on land glaciers, and no difficulty was found in making continuous profiles to the greatest ice depth encountered, which was 1300 m at the southern extremity of the Ross Ice Shelf.

The C-121J aircraft proved well suited to the task, in particular through its ability to make flights of over 12 hours duration using an additional fuel tank installed in the passenger cabin. Efficient operation of the aircraft was made possible by the comprehensive airfield facilities at McMurdo, including photo laboratories and weather forecasting based on satellite photographs and synoptic data. Effective staff planning and an efficient and keen aircrew were basic factors in a successful first season's work.

FOR THE LAYMAN

Dr. Robin told reporters: "Thanks to full co-operation from the U.S. Antarctic Expedition, we flew 20,000 miles over the smooth, undulating surface of the Central Ice Dome in three weeks.

"The flights, lasting up to 12 hours, were mainly at 1,000 feet above the Ice Dome. We were in a U.S. Super Constellation, cruising at about 220 knots from the U.S. McMurdo Sound base.

"The ice-sheet in the central region rises to 14,000 feet above sea level. Our radar, developed for the purpose by Dr. Stanley Evans, of the Scott Institute, proved very effective in mapping varied terrain lying within the great ice-sheet. We mapped terrain lying within ice ranging from 500 feet to 14,000 feet thick.

"We plan to continue our radar-mapping of the ice-sheet during two more summer periods within the next few years. The Scott Institute will again provide the radar and its operators and the U.S. will provide flying and other facilities."

Three U.S. Congressmen visited American scientific bases in the Antarctic in four days and 10,000 miles of travel in January this year. They were Representatives Richard C. White (D-Tex), Howard W. Pollock (R-Alaska) and Jerry L. Pettis (R-Calif). Mr. Pettis, a member of the House Science and Astronautics Committee returned from the Antarctic with his earlier misgivings about hopes for really significant scientific investigation being possible in so hostile an environment quite dispelled. "I will recommend on my return that we support very strongly these activities in Antarctica," he said.

RUSSIANS PLAN WIDE RESEARCH AT FIVE STATIONS

The programme for the 13th Soviet Antarctic Expedition (1967–69) provides for the following major activities:

The continuation of complex stationarv scientific observations in the Mirny observatory and at the stations Vostok, Molodezhnaya and Novolazarevskaya;

Geological studies on the Antarctic Peninsula and adjacent isles;

Oceanographic, hydrographic and geomagnetic investigations in the waters of the Southern Ocean and Antarctic seas;

The survey of the region of the Antarctic Peninsula and the choice of a place for the establishment of a new scientific station;

The organisation of the new station, Bellingshausen, in the region of the Antarctic Peninsula with geographic-hydrometeorological complex of stationary observations;

Submarine hydrobiological investigations;

Aircraft-borne measurements of the thickness of the ice cover of the Antarctic and of the thermophysical properties of snow;

The possibility of the establishment of a network of geodetic points in the Antarctic;

Experimental works on the boring of a glaciological borehole.

PROGRAMMES OF SCIENTIFIC RESEARCH

AT MIRNY

(a) Aerometeorological investigations, near-the-Earth meteorological and actinometric, ozonometric and aerological observations, weather service (accumulation of meteorological information and compilation of short-time weather forecasts);

(b) Geophysical researches including geomagnetic, seismic, ionospheric observations, observations of cosmic rays, aurorae, earth currents, radiowave propagation and radar probing of ionosphere;

(c) Radiometric measurements;

(d) Glaciological and coastal hydrological works, studies of shore ice, sea ice and icebergs, experimental boring of glaciological boreholes;

(e) Experimental works on organisation of an astronomogeodetical point;

(f) Medical studies.

AT VOSTOK

(a) Aerometeorological studies, aerological near-the-Earth meteorological and actinometric observations;

(b) Geophysical researches including geomagnetic ionospheric observations, observations of cosmic rays, aurorae, radiowave propagation and electromagnetic radiation of low frequency (whistling atmospherics);

(c) Complex glaciological studies with borehole boring and core sampling;

(d) Experimental works on organisation of astronomogeodetic point;

(e) Medical studies.

AT MOLODEZHNAYA

(a) Aerometeorological investigations, aerological near-the-Earth meteorological and actinometric observations;

(b) Geophysical researches, including geomagnetic, seismic observations, observations of aurorae and earth currents;

(c) Glaciological and hydrological studies;

(d) Medical studies.

AT BELLINGSHAUSEN

(a) Near-the-Earth meteorological and actinometric observations;

(b) Coastal hydrological works;

(c) Physio-geographical works;

(d) Medical studies.

SUMMER PROGRAMME

Seasonal work will also be carried out as follows:

Oceanographic research in the Southern Ocean and in coastal Antarctic waters (hydrometeorological observations, oceanographic stations, marine geological hydrobiological, hydrographic, hydroacoustic and radiometric observations;

A survey, including a geological survey of the north-western coast of the Antarctic Peninsula and adjacent islands. The choice of a site for the establishment of the new Bellingshausen station;

Hydrographic work in the region of the Antarctic Peninsula with the on-shore expeditions;

Hydrobiological works with the help of lightweight diving techniques in the region of Molodezhnaya Station and the Antarctic Peninsula;

A hydromagnetic survey with the help of a ship-towed magnetometer;

Radar measurements of the thickness of the ice-cover and measurements of the thermal-physical properties of the snow surface from an aircraft.

The 13th S.A.E. involves 181 winter personnel. These include four foreign scientists, two from DDR (East Germany), one from the U.S.A., one from Bulgaria. Two Soviet scientists will work at foreign stations. Fifty-two men took part in the summer seasonal programme.

SHIP MOVEMENTS

The expedition ship "Ob" left Leningrad on October 21, with Captain E. Kupri in command for his third season. Kupri was not the only "old hand" on board. Of the crew of 73, 45 had had previous Antarctic experience. The laundress was making her eighth voyage south. Several men were making their 12th voyage, and one man had been to the Antarctic 13 times.

The voyage to Alasheev Bay took 37 days. It was reported on December 23 that "Ob" was held fast about eight miles from Mirny after leaving Molodezhnaya. Air transport was used between ship and base. "Ob" suffered damage which necessitated hurried repairs. Her cargo included prefabricated buildings, tractors and two AN-2 aircraft for Mirny.

The research ship "Professor Vize" also taking part in the S.A.E., left Russia on November 18. The deputy leader of the 13th expedition, V. A. Shatonjev, was on board, with a team composed largely of young scientists.

VOYAGE OF THE "OB"

On December 28 "Ob" left Mirny. After piloting the "Professor Vize" to safety she made for Wellington, New Zealand, to take on food, fuel and water, and then proceeded to the Antarctic Peninsula to select the site for the new station. She was at Wellington on January 8–9. "Ob" carries a crew of 73, including 12 women, all on the catering staff, and had on board 56 returning expedition members.

On January 26 Prof. Treshnikov reported that "Ob" was clear of ice in the Antarctic Peninsula area and able to make a thorough examination of the surrounding sea for the first time. Hydrological stations were made to assess temperature, salt content and chemical constituents of the sea water. "Ob" was proceeding via Drake Strait to Molodezhnaya and then round the Antarctic continent to Novolazarevskaya — and home.

Hero of the Soviet Union E. I. Tolstikov, Deputy Head of the Hydrometric Service under the Council of Ministers of the U.S.S.R., in an interview with "Pravda" said on January 21:

"The members of the twelfth Soviet Antarctic Expedition have made more than 800 oceanographic stations and carried out 150,000 miles of sounding. The data obtained on sea currents and sea ice have considerably extended our knowledge of the Southern Ocean. However, the vast expanses of water which surround the icy continent still contain many 'blank spots'. For this reason considerable attention was paid to the extension of oceanographic research when the programme of the 13th expedition was being worked out.

"Four research vessels have proceeded to the Southern Ocean.

'Faddei Bellingshausen' and 'Boris Davydov', oceanographic vessels of the Hydrologic Service of the Navy, have participated for the first time. These vessels carried out a considerabout amount of work in collaboration with the 'Ob' in the Bellingshausen and Weddell seas, as well as in the adjacent sub-Antarctic waters. The members of the expedition had to carry out their work under difficult conditions, particularly in the Bellingshausen and Weddell seas, which are covered by drift ice and icebergs for the greater part of the year."

NEW SHIP FOR SCIENCE

In November 1967 the new Soviet scientific-research ship "Professor Vize" started on her first long voyage. The ship belongs to the Main Administration of the Hydrometeorological Service of the Council of Ministers of the U.S.S.R. The purpose of the voyage was the transportation of part of the personnel of the 13th Soviet Antarctic Expedition.

En route and in the waters of the Southern Ocean the new ship conducted a series of scientific studies, which in future will become her major activity. She has all the necessary equipment.

"Professor Vize" was built by contract with the U.S.S.R. in the shipyard in Wismar (GDR). The ship is 124 m. long and 17 m. wide by the frames. Her greatest draught is 6.1 m. The ship is one of the largest scientific vessels in the world; she is of 6,935 tons displacement with 2,046 tons of deadweight and tonnage of 5,497 registered tons. The ship has two engines of 4,000 h.p. each. They allow the ship to reach the speed of 18.2 knots (with 5 m. draught). The length of voyage without visiting ports is 20,000 miles. The crew of the ship is 86 men.

She has working space for research by 80 people in various disciplines in 29 laboratories equipped with the latest instruments for studies in the fields of physics, chemistry and biology of the ocean, its bottom, the interaction between ocean and atmosphere (which has great influence on meteorological phenomena), for ionospheric sounding, the upper charged layer of the atmosphere which influences the radiowaves propagation, etc. There are installations on board for the launching of meteorological rockets, which greatly enhances the possibilities of research in atmospheric physics.

The new vessel is commanded by the experienced Captain S. Pogosov.

MOLODEZHNAYA REPORTS

On November 30 two aircraft began to fly in to Molodezhnaya men and supplies from the "Ob", then blocked by ice 140 km. further north. Leader at Molodezhnaya this year is Nicolai A. Kornilov.

Molodezhnaya will eventually become the new "capital" of our Antarctic expedition. The polarists will have to build an automatic diesel electric station, a base for the atmospheric rocket probes, assemble antenna-towers for the radio centre. When "Ob" leaves the Bay of Alasheyev with the seasonal workers, twenty-eight men will remain at Molodezhnaya.

AT MIRNY

A fuel storage depot was built during the summer three kilometres from Mirny. It consists of three vertical cylindrical reservoirs each holding 1,000 cubic metres.

Out of the 58 workers at Mirny only 19 are new chums. The others have not just a few years behind them spent in scientific stations either in the Arctic or Antarctic. V. Ignatchenko has toiled for nearly a quarter of a century on Dickson Island in the Karsk Sea. Now this highly qualified specialist has changed his address, heading the radio squad of the expedition.

Wherever he happens to be working, on a drifting iceberg in the high latitudes of the Arctic, or in the Antarctic, the chief of Molodezhnaya, an experienced polarist, I. Titovsky, is always growing vegetables. This year the harvest from his "garden" was nine tomatoes and eighteen cucumbers.

"BELLINGSHAUSEN"

STATION SITE FIXED

Prof. A. Treshnikov, Leader of the 13th Soviet Antarctic Expedition, reported on February 4 that during the preceding few days "Ob" had examined the coast of the Antarctic Peninsula to decide the most suitable site for the new Soviet Antarctic station. This is to be named after the great Russian explorer Bellingshausen, who in 1820–21, complementing the work of Captain Cook 50 years after the English explorer's great southern voyage of 1772–73, spent considerable time in the Antarctic Peninsula area.

"Ob" was unlucky as regards weather and ice conditions, but the difficult task was successfully completed. The site selected for Bellingshausen Station is given as "Ardley Bay" on Waterloo Island, more generally known as King George Island (62° S., 58° 15′ W.), the largest island of the South Shetland Group, north of the tip of the Antarctic Peninsula. (The "Antarctic Pilot" refers to Ardley **Peninsula** but not to Ardley Bay.) "Ob" remained here long enough to complete the unloading of building materials, provisions, etc., before starting on her voyage back to Europe. She left behind a team of eleven men under the experienced A. Budretski to erect the station, where they will winter.

Bellingshausen is the first Soviet base to be established in this part of the Antarctic. It is 3,000 km. from its nearest Russian neighbour, Novolazarevskaya, but there is an Argentine summer station, Teniente Camara, on another island of the group and there were British, Argentine and Chilean bases on Deception Island until the recent volcanic eruption. A British base on Admiralty Bay and Argentine bases at Potter Cove and Ardley Island are not at present in use.

On January 4 the 10-tractor train Mirny-Vostok-Mirny was nearly half way to the Pole of Cold. The traverse leader Mechanic-engineer Lebedev, radioed that they were nearing the deactivated Komsomolskaya. The train was carrying 100 tons of equipment, food and fuel to Vostok, where the new team will be led by O. N. Struin.

Another train which set out from Molodezhnaya to complete ice measurements for several hundred kilometres by the most modern methods was on its way back to Molodezhnaya.

ANTARCTIC OASES

A RUSSIAN DESCRIPTION

For many thousands of years the Antarctic has been shackled by the ice shield — the coldest and the most lifeless continent of the earth. More than 13 million square kilometres are occupied by the ice, and only one-twenty-fifth of the area of the continent is free from the ice cover. These sectors are the oases in the desert of snow. There are only a few of them. The area of each one is not greater than 400 square kilometres. But together they comprise 600,000 square kilometres — an area comparable in size to the territory of a country such as Afghanistan.

Only recently, the oases have been one of the main riddles of the Antarctic. The discovery of the secret of the origin and existence among the ice of the ice-free sectors stands, in a large measure, to the credit of the scientists of the Soviet expeditions.

The oases originated in those areas where the glaciers moved around mountains, hills or parts of the coast during their movement. Hurricanes and winds, carrying enormous quantities of snow also did not reach these areas. The oases existed in the "glacial and snow shadows". The snow, falling on the oases, evaporates or melts and exposes for two or three months of the summer the basic bedrock of the Antarctic.

In the oases it is possible to see what the Antarctic would have been like if it had not been covered by the ice and snow. The dark rocks, free from the snow, are warmed by the sun to a temperature of 30–40°C. Even more warmth is accumulated by the lakes which are found in plenty in the oases. The air here is

Japanese Team Digs In At Syowa For Polar Trek Next Summer

Uppermost in the minds of Japan's Antarctic men is the big journey planned to be made from Syowa to the Pole and back after the coming winter.

The Japanese 7,760-ton vessel "Fuji" sailed from Tokyo on November 25, and arrived at Fremantle on December 10 carrying a team which hopes to make Japan's first land trek to the South Pole.

The 12-man party expects to make the 1,800-mile journey from Japan's Syowa base to the South Pole in 90 days, reaching the pole on Christmas Day, 1968.

In one of the ship's holds was a big snow vehicle which was specially developed to pull the expedition's sleds. It has been designed to withstand temperatures of 140° below zero and to drive more than 3,000 miles at high altitude. It is equipped as a mobile laboratory and has four berths and a kitchen.

Leading the expedition was Japan's foremost polar researcher and a former mountaineer, Mr. Masayoshi Murayama, of Tokyo's National Science Museum.

Mr. Murayama had been to the Antarctic five times and visited the pole by aircraft in 1962.

The overland trip is the main objective of the ninth Japanese Antarctic research expedition.

A four-man press team travelled with Mr. Murayama's party.

"Fuji" crossed the Antarctic circle on December 21 and entered the closed pack-ice zone some 280 kilometres north-east of Syowa Station on the 28th. The first flight to the station was made from 87 kilometres north on the 29th, when Mr. M. Murayama (49), leader of JARE IX, Mr. Z. Seino, deputy leader, and Captain T. Honda saw the high-spirited faces of the JARE VIII wintering team, including Mr. M. Ohse, the chief scientist. Transportation of goods was soon begun.

On January 5, "Fuji" moved in because the ice condition had improved, and at last, on the 12th, she succeeded at the first attempt in reaching the edge of the Antarctic Ice Sheet itself, only 5.5 kilometres S.E. of Syowa Station, where the goods for future inland trips including three large KD-60 snow-cars were landed. This was the first time in JARE history that the ship had reached the actual "coast". Next day, she moved to near the station. Owing to fair weather day by day, the air transportation was smoothly carried out, and the scheduled cargo, a total of 508 metric tons, was all disembarked by January 23. "Fuji" carried three helicopters.

Scientific investigations by the summer party were now carried out simultaneously with the repairing and constructing of some huts including that for the 65-kw. generator. Mr. Y. Fukui (biologist) and Dr. Y. Ohkubo (medical officer) made four skin-divings in the Langhovde Inlet on February 2. They reported that the temperature 7 metres below sea-level was −0.7°C., and the visibility was bad owing to the abundance of phyto-plankton.

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warmed to a temperature of 10°C. and its mean temperature in the summer is several degrees higher than of the air above the surrounding glacial regions.

A member of the wintering party in Bunger Oasis, the Soviet climatologist Andrei Solopov has made a detailed analysis of all the collected data and has characterised the oases as a special climatic region of the Antarctic. It is not unlikely that it is in these oases that the first cities on the Sixth Continent will arise, with permanent populations and industries.

LONG TRAVERSE

The inland party led by Dr. T. Torii returned to Syowa Station on January 15. The team, which consisted of nine men, had started their trip on November 5 with three KD-60 and one KC-20 snowcars and seventeen sledges. The aim was a preliminary survey for the long journey to the South Pole scheduled for JARE IX (1968–69). The route was selected along the meridian of 43° E.

Five days out the traverse party reached the depot previously laid, 234 kilometres from base. Four loaded sledges were dug out and drawn on behind the snowcars at 4 km. per hour. On November 29, 681 km. from Syowa, they were at approximately 74° S. and at an altitude of 3,000 m. The day temperature here was – 28°C. (– 18.4°F.) and the night reading – 42°C. On November 30 the team reached 75° S., 42° 50′ E., and here the team rested for three days before moving on towards the U.S. Plateau Station, which was reached on December 14. The total distance of this 71-day trip was 2,638 kilometres.

On February 3, the "Fuji" said goodbye to the station and began an oceanographical cruise through an ice-strewn sea. On the 8th, she approached the U.S.S.R. Molodezhnaya Station, and Dr. Torii, Mr. Seino and Captain Honda made a visit by air.

BODY FOUND AFTER SEVEN YEARS

On the 9th, Mr. K. Yanouchi, a geologist, unexpectedly found the corpse of Mr. S. Fukushima near the western edge of West Ongul Island, some 4 kilometres W.S.W. from the station. He had been lost in the heavy blizzard on October 10, 1960 (JARE IV). The cremation was held on the 10th, when his teammates Dr. Torii, Dr. Y. Yoshida, et al., prayed for his heavenly sleep. Next day, the "Fuji" started her home voyage, leaving behind the wintering team of 29 men.

The return voyage will be via Cape Town and Colombo, and "Fuji" is expected to reach Japan by April 12.

While "Fuji" was at Fremantle, a local shipping company presented the Japanese with three Western Australian Christmas trees, each 10 ft. high and complete with trimmings. Though few of the men are Christians, they intended to celebrate Christmas Day with traditional British fare, turkey and Christmas pudding.

STRANGE VISITOR

The 16,433-ton **"Kyo Kuyo Maru No. 2"**, a Japanese whaling factory-ship-cum-tanker, carrying 11,000 tons of fuel oil to the Japanese Antarctic whaling fleet, called at Wellington on December 21. With a draught aft of 34 ft. 5 in. she was only 28 in. short of the deepest-draughted ship ever to enter the harbour, the "Aquitania".

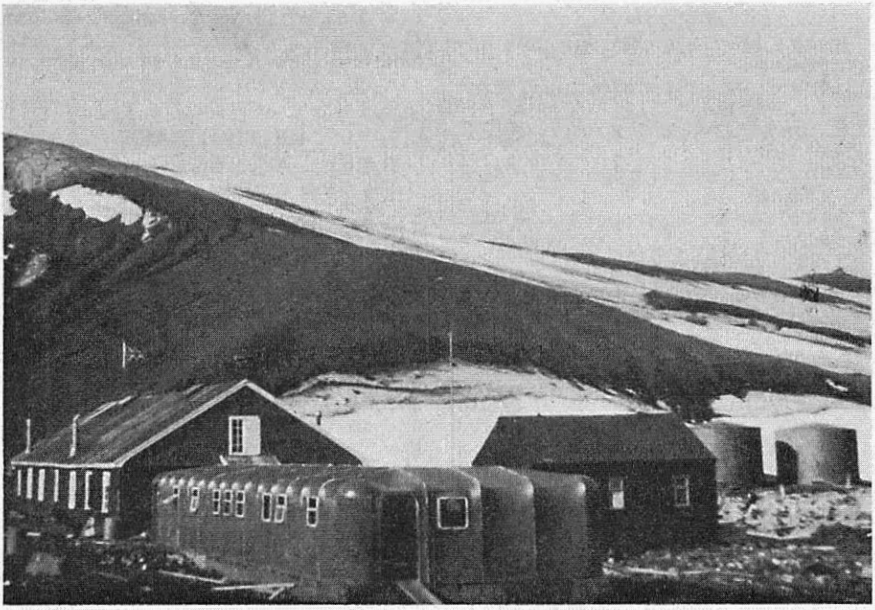
The ship left Yokohama on December 3, under Captain S. Torihara. When the fuel oil has been discharged she will be carrying 8,000 tons of whale oil to Rotterdam. She sailed for Antarctic waters after taking on 800 tons of oil and some stores, on the 22nd.

ADMIRAL BYRD AND NEW ZEALAND

Mr. A. Leigh Hunt, the nonogenarian founder of the N.Z. Antarctic Society and a close friend of Admiral Byrd's for 40 years, has written a book in which he recalls the close association between Byrd and New Zealand.

Entitled **"MY SECOND HOME"**, this small volume of some 100 pages throws a most interesting light on the Admiral and his New Zealand friends and helpers, and reveals a Byrd little known to most men. All Antarctic enthusiasts will want to have this attractively produced volume on their shelves. It will be available in the bookshops and also from the Antarctic Society.

To be published shortly. Price $1.50.



B.A.S. BASE ON DECEPTION ISLAND
Note dark volcanic ash with which the island is covered.

ANTARCTIC STATIONS

12

DECEPTION ISLAND

(62° 59′ S., 60° 34′ W.)

Deception Island lies in the Bransfield Strait in the south-west of the South Shetland Islands group. It is the site of the oldest of the permanently-manned British bases, which was opened in February 1944 and has been occupied continuously until it was temporarily evacuated as a result of the recent volcanic eruption.

The island is an almost circular caldera (measuring 9 miles north-south and 8 miles east-west) formed by the subsidence of a group of overlapping volcanoes. It is one of the most remarkable crater islands in the world, and one of the most important natural harbours in the stormy Southern Ocean.

From a distance it appears to be a low, dome-shaped island (hence its name), bounded on all sides by vertical cliffs of rock and ice, but in the south-east the caldera rim is breached by a narrow channel (Neptune's Bellows) which gives access to the large inner basin of Port Foster.

The mean height of the island is about 1,000 ft., but Mount Pond on the eastern side rises to 1,890 ft. and hills in the south-west to heights varying from 650–1,316 ft. There is less snow and ice on Deception Island than on any other island of the South Shetlands, but the east coast consists of a straight ice cliff about 4 miles long, and there are smaller ice cliffs along part of the southern coast. Some sandy beaches occur, especially on the northern coast, and at each end of the eastern ice cliff. Esewhere, the coast is steep and rocky, with numerous rocky islets close in-shore.

Hot springs abound and volcanic heat causes the beaches to steam at low tide.

WEATHER

Annual statistics are approximately as follows:

Annual mean temperature: 27°F. (−2.8°C.).

Extreme low temperature: 13°F. (−10.6°C.).

Extreme high temperature: 48°F. (8.9°C.).

Annual mean wind speed: 6 knots.

HISTORY

The South Shetland Islands were discovered almost 150 years ago. Sealing had begun in the southern hemisphere in the latter half of the 18th century, and by the early part of the 19th century stocks at South Georgia were becoming exhausted and a search then began for new sealing grounds. As a result, the South Shetlands were discovered and claimed for Great Britain in 1819, by Captain William Smith of the brig "Williams". The islands were roughly charted in 1820 by a naval officer, Edward Bransfield, who incidentally sighted the northern tip of the Antarctic Peninsula (the first sighting of the Antarctic mainland), and a very fine chart of the area was published by George Powell, another British sailor, in 1821–22.

The area was soon exploited. As in South Georgia (and also the South Orkneys) the sealers proceeded to work the rich fur-sealing ground of the South Shetlands so systematically that by 1830 the southern fur seal was almost exterminated and the industry had consequently declined.

Whaling in the Antarctic was pioneered by the Norwegian C. A. Larsen in 1892–93. By 1912–13, six land stations (including one on Deception Island) had been established and there were 21 floating factories and 62 catchers. Many of the factory ships used anchorages in Deception, and a British Stipendiary Magistrate was resident there each summer from 1910 until 1931, by which time the catches had dwindled and the shore station was finally abandoned.

In connection with the whaling industry, "Discovery Investigations" (now part of the National Institute of Oceanography) carried out oceanographical observations and a survey of the whaling grounds around Deception and the rest of the South Shetlands, in a series of voyages in 1925–31 and 1935–37.

BRITISH BASE

British, Argentine and Chilean bases were established on the island in 1944, 1948 and 1955, respectively. The British base was opened on February 6, 1944, near the site of the disused whaling station, and has been occupied continuously ever since. From it, the island has been surveyed topographically and geologically. Biological work has included observations on the three species of penguins (Adélie, gentoo and macaroni) which are found on the island, bird-ringing — especially of terns and cape pigeons, microbiological investigation of some of the lakes and botanical collecting. Meteorological observations have been carried out without interruption.

In 1955–57, the base was used as the headquarters of the Falkland Islands and Dependencies Aerial Survey Expedition, which carried out an aerial survey of the South Shetlands and the Antarctic Peninsula south to 68° S. In more recent years the base has been used as the winter servicing centre for British Antarctic Survey aircraft.

The British base consists of four main buildings standing on rock foundations. There are two living huts joined by a corridor. One is entirely of timber construction (120 ft. by 25 ft.) and contains offices, workshop, laboratory and a recreational area, and also provides emergency sleeping quarters. The second is made of prefabricated laminated fibreglass panels and provides the main living area (75 ft. by 20 ft.). Joined to these is a third hut which consists of a steel frame on concrete piers, clad with timber panels, housing the generators (two Lister 12 kw. 220 v. 50 c/s. single-phase engines). There is also an aircraft hangar (71 ft. by 53 ft.) built entirely of metal and standing on concrete piers. There are a number of small ancilliary buildings, such as a tractor garage, boat shed and general workshop.

The air-strip is 650 yd. long, on volcanic ash, and is covered by snow in winter.

THE VETERANS

JAMES DELL

In our June, 1966, issue, we published an article on "Four Discovery Men", the only known survivors of Scott's first (1902–4) expedition. Of the four, only two, Ford and Plumley, are now alive. Hare died in Queensland last year, and now we regret to report the death in Somerset on January 21 of James William Dell, at the age of 87.

"Jimmy" Dell, trained under sail as an able seaman, was the typical stalwart seaman whose courage and endurance played such a large part in early Antarctic exploration. A member not only of the "Discovery" expedition but also of Shackleton's "Quest" expedition, his last, in 1921–22, he was warmly praised by Scott for his excellent management of the dogs and by Worsley, Shackleton's New Zealand navigator, for his services in handling the sounding gear under difficult conditions.

He served in the Navy in the first World War, seeing action off the Dardenelles and serving in the Harwich Flotilla.

In the last war he joined the Coastguard Service, and was the watcher-in-charge of a local auxiliary station. He was also involved in special and secret work under the Army Command which, in the words of the then Chief of the Imperial General Staff, "was a very valuable contribution to the security of the British Isles".

Mr. Dell was present at some of the shooting of the film "Scott of the Antarctic", and at its first showing in London. He was a founder member of the Antarctic Club, also the longest standing member, and regularly attended its annual dinners in London. His last visit to the metropolis, in October 1966, was the occasion of a reunion of Antarctic veterans, and others interested, on board the "Discovery" to celebrate the publication of Dr. Wilson's diaries of the Scott expedition. An interview with him on the "Discovery" was broadcast by the B.B.C.

Despite a severe operation in 1964, from which he made a remarkable recovery considering his age, he kept pretty active and mentally alert to within a few months of his death. Throughout his last illness he was devotedly nursed by his wife who, in a letter to the daughter of another "Discovery" man, C. H. Hare, just before Dell's death, wrote:

"I am pleased to say he is in no pain but just grows steadily weaker. He is going down with all flags flying like a true Antarctic sailor, and has a cheery word and smile for everyone. He has endeared himself to doctors and nurses alike." He died peacefully.

Mr. Dell was cremated; a large number of friends attended the service, and his ashes were scattered on the sea. There were no flowers with the exception of the family tribute and a wreath from the Scott Polar Research Institute of Cambridge, but donations were to be sent to the latter and the local hospital.

He is survived by his wife, two daughters of his first marriage, grand and great-grandchildren.

ERRATUM

We regret the misplacement of two photographs in the "Antarctic Stations" article on Base Roi Baudouin in our December issue. The **illustrations** on pages 627 and 629 should be transposed.

PERSONNEL

The wintering party usually numbers 9–12 men, but it may be augmented by additional field workers in the summer.

ICE

An International Symposium on **ANTARCTIC GLACIOLOGICAL EXPLORATION** will take place at Dartmouth College, Hanover, New Hampshire, U.S.A., between September 2 and 7 this year. Organised by the SCAR Working Group on Glaciology, it will cover a broad field, with emphasis on the ice sheet, ice shelves and sea ice. Enquiries to Dr. U. Radok, Meteorological Dept., Univ. of Melbourne, Parkville, Victoria 3052, Australia.

NEWS FROM THE SUB-ANTARCTIC

CAMPBELL ISLAND
(New Zealand)

O.-in-C. Reg Blezard reports:

Summer draws to a close. Quite frankly we are all looking forward to a more settled routine after the last ship has departed. Since the last report (Dec. 1967) the party has reached its full complement for the 1967–68 season with the arrival of Tony Ellis, electronic technician, relieving Gerry Therkleson. The two summer carry-over Met. staff who will return on the U.S.S. "Mills" will be "Toe-knee" Bromly and "Moritzzz" Hodgeson, the Sir Francis of Campbell. Both men have rendered valuable assistance to the new party and have certainly done an excellent tour of duty for the past 17 months.

The station is bristling with recent innovations. The Beacon Complex was completed last year and the final refinement is to be the addition of automatically operated lights. Two new satellite antennae, associated with the new receiving equipment, have been erected. The wharf extension built by Robin Foubister's merry men now sports a reinforced concrete apron, and the raft used during the construction has been replaced by one of smaller dimensions, as yet unnamed (though "African Queen" is favoured by the seal-defying Bogarts who have used her). The Met. staff have started laying a great shingle "patio" on the balloon release area to end the present tussock-jumping antics which are rather hazardous to limb and 'sonde. Some exotic flora was introduced in the form of old billiard cues, used with steel tape and pilot balloon theodolite; a survey of the station was made from which a new site plan will be drawn. However, at present the map shows only the botanical distribution of flora billiardi.

VISITORS

The regular summer logistic support of the U.S. picket ships "Mills" and "Calcaterra" has been excellent and we would like to record our appreciation to Commanders Felt and McCraine, with their ships' companies, for a fine show. During the season we have been pleased to entertain Mr. Dave Clark, who came to test the new satellite equipment; Mr. F. C. Kinsky, a friend of long standing, and Mr. Wim Spiekman, both from the Dominion Museum, Wellington, and Mr. David Paull, of last year's party, who were here to collect and preserve specimens of bird life and to consolidate the results of four years' intensive study of the Royal albatross by previous expedition members. A brief visit by Mr. Ted James, an official of the Department of Civil Aviation, preceded the arrival of Mr. Peter Roberts, Victoria University, here to continue his work on the plankton and crabs of Perseverance Harbour. Our last official guest of the season was Captain Murray Church, Harbour Master, Dunedin, on a courtesy call.

The "Magga Dan" made two visits to Campbell, on the 2nd and 9th to 10th February, and gave us (we believe) the first opportunity of hoisting the Danish flag at our yard-arm. Unfortunately most of the local fauna had departed but the three field trips programmed gave a comprehensive view of current species for the ship's passengers. Our visitors proved to be both intelligent and charming. For so little effort we were showered with gratitude and generosity, and learned much of value in conversation with the specialists. An unexpected call by H.M.N.Z.S. 'Endeavour" on February 11 coincided with the arrival of our last inward mail and stores picket U.S.S. "Mills", which gave the station's harbourmaster and personnel the busiest four days of the season.

WHERE ON EARTH ARE WE?

Whilst engaged on the survey and positioning for the Navigation Aids, discrepancies were found in the geographical graticules on two charts and the topographical map of the island. Investigations led to a request from Captain McCraine, U.S.S. "Calcaterra", for a position check by the research vessel "Eltanin", en route

south, whose company kindly obliged by furnishing satellite/radar computed fixes on six points along the eastern coast. The plotted positions indicate that our poor little island is spinning madly at a rate of one anticlockwise revolution every 45,880 years and is on a collision course with Guatemala at a speed of 0.00001142 knots. The authorities have been informed.

KERGUELEN

(France)

Relief of French Island stations this season was held up for a month in order to facilitate the transport of material required for the rocket-firing programme. The "islanders" made sure that everything was quite ready when the "Gallieni" arrived. They had not been without callers. The arrival of the tanker "Betsiboka" in December ensured a re-supply of fuel oil for both Kerguelen and Amsterdam. The ship had called earlier at the Crozets to examine Port Alfred base in view of the erection there this year of the final bulk storage station with a capacity of 300 sq. m. It brought mail and fresh victuals for all the bases.

During the quarter October–December the mean temperature rose from 2° to 6°. October was fine, November grey and dull, while throughout the three months the islands' reputation for violent winds was maintained. All exterior work was completed on time. By the end of December not only were the installations for the rocket-firing completed but the new generator was also installed. Once the roof was on (24 hours before a wind of 150 km. per hour) all the interior fittings were installed without trouble and the motors had their first run-in just before Christmas.

The earthwork required for the new radio transmitting station on Gabrielle Hill was completed successfully. Also scheduled was a marine biology laboratory of 300 sq. m.

A special feature in the summer programme was the firing of three Dragon rockets by the National Centre for Space Studies.

"GALLIENI"

The relief ship "Gallieni" was scheduled for four voyages during the summer months. Her itinerary included on voyage (1) calls at Crozet and Kerguelen (January 11–24), on voyage (2) Kerguelen (February 22–26) and on voyage (4) Kerguelen and Crozet (April 13–21).

CROZET

(France)

October on the Crozet Islands was the best month of the year. Quite a team of men took advantage of an ornithological programme in order to carry out a reconnaissance trip to Pointe-Basse, a difficult journey. The area appeared to be of considerable biological interest. This was the bright spot in a dull quarter, conspicuous for its execrable weather. To fit in with the meteorological changes, painting the exteriors and interiors of buildings was done alternately.

The unloading pontoon was strengthened by the fitting of a metal platform. Finally, as the result of work done during the second quarter of 1967, the greenhouse became operational on December 28. This construction, erected on a slope, has required more stonework than was anticipated. Sixty-eight square metres in area, with a basement of 32 sq. m., it could also serve us as a food store. If the salads were not ready to eat by the time the new team settled in, the Crozet report said, they would grow and multiply!

Available from November 28 last, thanks to the co-operation of the Parisian P. and T. service and "Radio Kerguelen", direct radio-telephone communication became possible between Crozet and Paris.

MACQUARIE

(Australia)

A few notes from Rob Walker's last newsletter:

November lived up to the Macquarie reputation and gave foul weather for the first 14 days. So much so, that Chapman and Reid on a trip around the island were benighted in a cave not more than 500 yards from Caroline Cove, the

seas blocking the coastal route and the wind and almost horizontal snow the high road to comfort.

Gleeson ventured forth to Green Gorge to view the island scenery and also to replenish our store of rabbits — the weekly meal of baked, boiled, stewed or curried rabbit being a welcome addition to our meat supplies.

New leader Hasick reports:

During January, the period of unpacking and settling into living and working quarters and the demands of the heavy meteorological, scientific and construction programmes kept everyone on the go. Fortunately the weather was very kind to us and good progress was made in all fields.

The biological programmes got off to an early start with the major effort centred on the Royal penguins at Bauer Bay. The penguins have not had a moment's privacy. **Beasley and Lane returned from Caroline Cove in a single day — a notable feat since the 20 miles distance contains much difficulty terrain.**

In their erection of complex aerials to investigate ionospheric disturbances, three monthers, Reid, Shaeffer and Yuan, have successfully constructed one of the largest bird traps imaginable.

The auroral laboratory and the surgery have been extended, and the geophysicist is soon to move into a new laboratory. Simpson set a new record for speed of emergence from the cold-water tank outside the sauna when he found he was sharing it with a somewhat irate penguin.

Cutler chalked up a first for the year by making a closer than anticipated examination of the contents of a seal "wallow" while retrieving the football during an after-lunch game. He was visibly unimpressed!

The difficult task of getting the met. section's new three-ton radar ashore and siting it a quarter of a mile from the landing spot was achieved satisfactorily, due in no small way to the efforts and ingenuity of Diesel Mechanic Goodall. Then came the lengthy tasks of concreting, wiring and tuning, and Radar Technician Barnes was a very happy man when the radar was finally put on the air.

The "Gnat", a small three-wheeled vehicle, has been successfully repaired, and Botanist Jenkin is often seen tearing along the main street across the isthmus en route to his study areas.

As verification of the good weather we have experienced, here are a few statistics: average wind speed, 15 m.p.h.; average daily sunshine, 3.7 hours; average temperature, 44°F.

ALL-WOMAN TEAM

Surely the ramparts are now to be scaled. It was reported from London on February 11 that "an all-woman expedition to the Antarctic" had been announced by the Earl of Cromer, Chairman of the Winston Churchill Memorial Trust for 1968, which is to finance the expedition.

It will be largely a mountaineering enterprise.

Led by Mrs. M. Porter, 29, mountaineering instructor and guide, of Kingussie, Inverness-shire, Scotland, it will be the first all-woman expedition to visit the Antarctic.

"Much of her time", said the Earl, will be spent in South Georgia, where she will lead her expedition up an unclimbed peak so rugged that dogs cannot be used, and the ladies will have to pull their sledges uphill themselves."

South Georgia, 1,000 miles southwest of the Falkland Islands, is 150 miles long and 20 miles wide, an island of mountains, snow, ice and glaciers.

It used to be a base for whalers, but the only inhabitants now are a small administrative community — and seals and penguins.

Mrs. Porter became interested in leading an expedition to South Georgia a year ago after her husband visited it.

John Porter, 32, stayed at the island for three months during an 18-month tour of duty in the Antarctic with a British survey team.

Mrs. Porter said: "We are not trying to prove anything about women.

"I'd as soon go with men, but I have made the expedition up of five friends who are very experienced in snow and ice, and they just happen to be all women."

FIRST TOURISTS ARRIVE

Dawn of a New Age?
Or
Beginning of the End?

The first tourists to McMurdo Sound made an inauspicious arrival.

Their ship stuck on what has been variously described as a mud bank, a shoal of volcanic rock and an ice pinnacle within a stone's throw of the old Hut Pt. hut.

The tour, one of two, had been arranged by the New York organisation of Eric-Lars Lindblad and the tourists travelled on the polar vessel "Magga Dan", chartered by the shipping firm of J. F. Holm & Co., Wellington, from the J. Lauritzen Co. of Denmark.

The first party of 24 tourists, mostly from the United States, arrived in Auckland on January 4. The party comprised doctors, lecturers, business executives and scientists.

"Magga Dan" is a diesel-driven trading ship with a specially-strengthened bow and hull to withstand the tremendous pressures built up during travel in ice fields. The vessel has been in Antarctic waters many times and was support vessel for Sir Vivian Fuchs' transpolar expedition in 1957. It was manned by New Zealanders.

A wooden ship with an icebreaking prow, the "Magga Dan" is a better vessel for the job than the thin-skinned Argentinian ship "Lapataia" used for a Lindblad cruise to the Antarctic Peninsula below South America last summer. Because of pack ice and icebergs she was unable to cross the Antarctic circle. Many of the "Magga Dan" tourists had been on this earlier cruise.

Mr. Lindblad said all members of the expedition must have shown interest in the Antarctic generally, especially its wildlife, before their bookings were confirmed.

They attended a number of lectures during the cruise. The main emphasis was on marine biology, ornithology and wildlife conservation.

Retired United States Navy officer Captain E. A. McDonald was Antarctic guide for the tour parties. He is a former Antarctic task force commander and was deputy commander of the United States Antarctic Operation for six seasons.

One major novelty the "Magga Dan" brought to this side of the Antarctic was femininity. Twelve of the first tourists were women. The only previous visit by women to this part of the Antarctic was in 1958–59 when two air hostesses visited McMurdo Station on a Pan American Airways aircraft and stayed for two hours.

The tourists did not have to melt snow to get water as "Magga Dan" has a desalination plant capable of producing eight tons of fresh water a day from the sea.

Accommodation for the tourists was comfortable, but not luxurious, in small two- and four-berth cabins. A scientific laboratory was set up in one of the ship's holds, and most of the entertainment during the cruise was of an educational nature.

Mr. E. R. Gibbs, of Taihape, president of the New Zealand Antarctic Society, and Mr. R. M. Heke, president of the Canterbury branch of the

Society, speaking at a dinner party given by Mr. Lindblad and attended by the tourists and members of the society, wished the tourists well on behalf of the national organisation. They were all made members of the Canterbury branch and presented with badges.

HEADED SOUTH

"Magga Dan" departed from Lyttelton on January 8, giving the tourists five days in New Zealand before the trip. A further two days were allowed at the end.

The vessel called in at Waitangi, Chatham Islands, on January 10.

A large number of residents met the vessel on arrival and escorted the party to the county hall for lunch, consisting mainly of island dishes. Motoring parties were then made up to show the visitors the island, including crayfishing, sheep and meat industries, bird life, and fauna.

The vessel left at 8.30 p.m. to spontaneous singing of farewell songs.

A call was also made at the Bounties.

AGROUND

"Magga Dan" ran aground on a shoal while rounding Hut Point at the entrance to Winter Quarters Bay, 50 yards from her destination at 9.05 p.m. on January 22.

She stuck fast and after trying to dislodge herself by her own engine, asked for assistance from the United States naval authorities.

The icebreaker "Westwind" made many unsuccessful attempts for about three hours to remove the 1,957-ton vessel, but "Magga Dan", apparently undamaged, was held fast midships by her number two hold.

No water was taken aboard and all the crew and 25 passengers remained on the ship.

RESCUE OPERATIONS

A high southerly wind arose at 5 a.m. and this caused "Westwind" to stop work. "Magga Dan" was about 12 ft. higher than normal at the bows during the rescue attempts.

At the time "Westwind" was called to "Magga Dan's" aid, the icebreaker was escorting the U.S. Navy's supply ship "Alatna" through the ice-strewn shipping channel of McMurdo Sound. On the way to rendezvous with "Alatna", near Beaufort Island, in the Ross Sea, "Westwind" had passed "Magga Dan" at the entrance of McMurdo Sound at Cape Bird, about 60 miles north of McMurdo Station. She was then making slow but steady progress through the ice.

On the return voyage to Winter Quarters Bay while escorting "Alatna", "Westwind" was advised of "Magga Dan's request for assistance and, after the supply ship had berthed, the tourist ship's situation was evaluated and a towing line extended between the two ships.

"Westwind" approached very cautiously, and the tow line was linked from "Magga Dan's" stern to "Westwind's" bow.

FIRST TRY

The first attempt to dislodge the "Magga Dan" was made by the "Westwind" on Monday morning, the 22nd.

It was abandoned after three hours when the weather suddenly worsened, and strong winds blew ice floes between the ships. Visibility became seriously limited.

Little damage was reported, though the tow caused some anxious moments on board the "Westwind". At one stage it was feared that the enormous concentration of power from the "Westwind's" six engines could have badly damaged the "Magga Dan".

The 25 tourists and crew were on board the "Magga Dan" while the "Westwind" towed it free. The decks of both ships were cleared in case the tow hawser snapped.

Rasping noises were clearly heard as the "Magga Dan's hull plates and keel scraped on the volcanic rock shoal.

FREE

Thirty-seven hours after running aground the ship was towed free about noon on the 23rd, Tuesday, by the icebreaker "Westwind".

The tow began about 9 a.m., after the "Magga Dan" had struggled since 5 a.m. to free herself.

Because the "Magga Dan" was held amidships extreme care had to be taken, "or they could have pulled the bottom off the ship", said a Navy spokesman.

Competent observers agree that it

was extremely lucky that the weather held, and that the "Westwind" was available to render assistance.

The tourists were shuttled from ship to shore in a lifeboat while the "Magga Dan" was stranded.

It is only a short distance from the shoal to the hut built by Captain Scott's 1901–4 expedition.

The tourists filled in some of their time sightseeing around McMurdo Station. Later most of them visited Scott Base, two miles away over a well-made road. As no vehicles were available for transport, and the truck taken aboard almost at the last minute could not be taken ashore until the last day of the visit, tourists straggled across to Scott Base in small groups. The truck was got ashore in time to bring some of the visitors — including some elderly women — back to the ship.

The "Magga Dan" was now berthed in Winter Quarters Bay. She was still there on Wednesday, the 24th, reported as "plagued by engine trouble", the exact nature of which was not known.

The "Magga Dan" dropped anchor in open water about 300 yards from the spot where it ran aground on Sunday, and sailed on Wednesday for Cape Hallett, about 325 miles away. Captain F. Bang reported that the vessel's engine trouble was put right in a matter of a few hours.

On the return voyage the ship called at Cape Evans where the tourists were ferried ashore to see Scott's hut—from the outside and at Cape Hallett.

"Magga Dan" berthed at Bluff, not Wellington, as originally planned, after a call at Campbell Island on February 2.

CELEBRATION

A cocktail party, followed by dinner and entertainment by a troupe of Maoris, was held for passengers from the cruise ship in Wellington on February 4.

They had arrived in the city on a chartered flight from Invercargill for the farewell party.

Captain and Mrs. J. F. Holm were host and hostess at the party, which was held at the White Heron Lodge.

The Mayor (Sir Francis Kitts) welcomed the guests and commended all concerned with the tour on their initiative.

The tourists from the "Magga Dan" said that the first Antarctic tourist cruise had been a great success.

WOMEN

Seventy-two-year-old Mrs. Jessie May Wright, of Louisiana, is rapidly becoming Antarctica's most avid visitor.

A passenger on the first cruise, this was not her first visit to Antarctica. In 1967 she travelled to the Antarctic Peninsula south of Cape Horn on the Argentine ship "Lapataia".

One of the expedition staff was Mrs. Marie Darby, the wife of the New Zealand zoologist and photographer, John Darby, who at the time was working at an isolated penguin colony at Cape Bird, 60 miles north of Scott Base. The first New Zealand woman to visit the continent is a marine biologist with the Canterbury Museum.

On the second cruise was Mrs. Braxton, secretary of the Canterbury branch of the N.Z. Antarctic Society and a member of the Dominion council. She was second New Zealand woman to visit the continent, and travelled at the invitation of Mr. Lindblad.

She began her career in journalism on the "Southland Times", later worked on the "Southland News", and the "Christchurch Star". Mrs. Braxton is now the South Island representative of the "New Zealand Home Journal".

According to Mrs. Lo Chen Holton, a newly-wed passenger from the "Magga Dan", Antarctica is a "wonderful place for a honeymoon". She and her husband were in Wellington with other tourists who had just arrived back from Antarctica.

SECOND CRUISE

On her second voyage as an Antarctic tourist ship, "Magga Dan" left Bluff on February 6 and reached Winter Quarters Bay, McMurdo Sound, on February 19, after an incident-free voyage. Campbell Island was visited on February 9-10.

The cruise party's marine biologist, Mrs. Marie Darby, was reunited with her husband, John Darby, who was a member of the Canterbury University biological team which spent the summer at Cape Bird. The two had spoken to each other by radio before the meeting.

The second party called at Cape Hallett on the voyage south, and on the return voyage the tourists were able to see Sturge Island and Borrodaile Island in the Balleny Group, and to visit Macquarie Island, and the Auckland Islands.

ANTARCTIC TOURISTS

STRINGENT CONDITIONS

Self-supporting groups of tourists, including women, will be allowed to visit New Zealand stations in Antarctica, but only if they comply with stringent conditions laid down by the Government.

Though Scott Base is designed for "male only" living, suitable arrangements will normally be made for women to accompany tourist groups.

Designated "science areas" will be out of bounds to tourists unless they are guided through such areas as part of an organised visitor group accompanied by an official from Scott Base.

New Zealand's conditions were drawn up in consultation with the United States and Operation Deep Freeze authorities, in view of the proximity of the respective bases.

Under the Antarctic Treaty the Government, along with the other parties to the treaty, is responsible to ensure that persons visiting Antarctica comply with the treaty provisions.

Tourists also have to comply with the recommendations of consultative meetings of the treaty parties and with the agreed measures for the conservation of Antarctic fauna and flora.

New Zealand is required to inform the other partners in advance of all expeditions to and within Antarctica on the part of its ships or nationals, and of expeditions organised in or proceeding from its territory.

Tourist expeditions wishing to visit New Zealand stations have to seek approval in principle through the superintendent, Antarctic Division, of the Department of Scientific and Industrial Research. He will require evidence that the expedition is entirely self-supporting and that adequate safety precautions are being undertaken. He will also require assurances that the organisers will comply with the Antarctic Treaty and other conditions applicable at the stations to be visited.

Final permission for such visits will be given by the leader, Scott Base, in the light of the situation in the area at the time.

Normal courtesies will be extended to tourists, but operational limitations within Antarctica will restrict such courtesies and common services. Since the tour group must be self-sufficient, the Government will not be required to assist with transportation, operational support, food or shelter. Such support and assistance will be provided only in an emergency situation.

Post Office facilities at Scott Base will be available for use by tourists. Visits of station personnel to the expedition ship must be arranged through the leader, Scott Base.

The huts at Cape Royds and Cape Evans have been locked and only conducted tours will be permitted.

PENGUINS PERISH

According to press reports in Australian newspapers in January, Dr. William J. Sladen, leading American penguin authority, from the John Hopkins University, states that the Emperor penguin rookery at Cape Crozier has been devastated by a furious storm that killed every chick. No sign of Emperor chicks was found in mid-October at the end of the Antarctic winter.

ANTARCTIC BOOKSHELF

ACROSS WEST ANTARCTICA. By John Pirrit. John Smith and Son, Glasgow. 130 pp. 16 ill., charts. U.K. price 25s. net.

John Pirrit, a Scot, found time after four years' war-time service in the Navy, graduation with honours in geology and zoology, climbing expeditions and a foray to Iceland, to spend two years (January 1958 to February 1960) with the Americans in the Antarctic before returning to his studies in his middle thirties, cut tragically short when he was drowned while on a sailing holiday in the Firth of Clyde in 1962. This short but exciting book is his own story of those Antarctic years.

He wintered in 1958 at Ellsworth Station at the base of the Weddell Sea and then in the 1958–59 summer led a traverse team of four Sno-cats drawing sledges from Ellsworth south-west for nearly 1,000 miles across the base of the Antarctic Peninsula, West Antarctica, to Byrd Station. This notable journey traversed for a start the same difficult crevassed area which confronted and held up Fuchs in early 1958. Pirrit's team also had trouble here, and then diverged from the TAE route and struck west (not south as Fuchs did) across areas not previously traversed on the surface, the Filchner Ice Shelf, the ice-covered island and the inland ice of Ellsworth Land. At the junction of Ice Shelf and continental ice about half way across another dangerously crevassed area was encountered.

Pirrit's story of this crevasse-studded journey is told without heroics and indeed with more than a little wit. These "innocents on ice" (his own term) had some exceedingly narrow escapes. There are phosos comparable with the famous Fuchs one to prove it. There is no outstanding prose. But the adventures told modestly with disarming candour convey compellingly the care, determination, courage and skill of the traverse leader.

"We were crawling in low gear as slowly as we could possibly move when we felt a jar as the sledge broke through a snow bridge and crashed vertically against the wall of a large crevasse. I climbed through the hatch on to the roof of the Sno-cat to have a look, while Goodwin opened the rear door. We could see the tracks made by our vehicle and sledges coming smoothly downhill and terminating abruptly at the lip of a ragged black hole into which our third sledge was hanging. . . . Two boxes of dynamite and a few small items had fallen out on to a ledge about 30 feet down. I belayed Goodwin while he rapelled down to have a look."

And a little later:

"The rest of that day was spent probing our way into the zone. By supper time we had found 39 crevasses."

Here they were forced to turn south again, and their ultimate escape route was along a corridor about a mile long between two parallel crevasses. It brought them to the solid inland ice. Their reward was the discovery on December 5, south of 81° S. and nearly 800 miles from Ellsworth, of mountains which — cautiously — they thought to be perhaps three miles away on their right. This was in an area where the ice surface was over 3,000 feet above sea level and where many theorists believed there was a deep trough separating east and west Antarctica. They drove one Sno-cat towards the highest peak — hour after hour — until they realised "the joke had been on us" and found on survey that the peak was about 5,000 feet high and some 70 miles from the point where they had first guessed it was about three miles away.

Later — on the 10th — they found accessible peaks and succeeded in

reaching the rock outcrops on steep cliff faces, where the geologists were happy. It was their first rock in 885 miles of traverse.

On December 16 they asked Byrd Station for a re-supply of fuel. A DC-3 reached them on the 19th. But 25 miles further on their invaluable mechanic suddenly collapsed and an emergency flight was made to evacuate him.

Four days before the dead-line set them for arrival, with fuel tanks practically empty, they "stubbornly" set off in a half-blizzard and were almost convinced that they had missed the station when they saw some debris and then, "in a brief lift of the swirling, blowing snow, no more than 100 yards away" they saw Byrd Station.

"We called the base on the radio. The voice of the operator came in loud and clear telling us that we had a 'strong signal today'! We tried hard to sound nonchalant as we told him that we were sitting just outside. Would he send someone out to show us where to leave the vehicles."

Pirrit led two further traverses and wintered at Byrd Station as scientific leader. His book will be a worthy memorial to one of whom Professor Neville George in an introduction says, "He was a good man to know."

L.B.Q.

DR. WILSON AMONG THE BIRDS

BIRDS OF THE ANTARCTIC: Edward Wilson: edited by Brian Roberts. 191 pp. London, Blandford Press. U.K. price 5 gns.

To say that this beautifully produced volume contains nearly 100 full pages of Dr. E. A. Wilson's bird drawings and paintings is surely enough to excite anyone interested in birds and anyone interested in the Antarctic. To add that the volume is edited by Dr. Brian Roberts, that there are seven pages of notes on the drawings, and reproductions of diary pages, must make the attraction irresistible.

This is indeed a splendid production. For full measure there is a 15-page biographical memoir of Dr. Wilson and an article on "Wilson the Artist" as well as 35 pages of relevant extracts from Wilson's journals, helpfully annotated. Of these, 13 refer to the "Discovery" expedition and are therefore also given in the recently published "Journals of Edward Wilson". The other extracts include Wilson's own report to Scott of the Winter Journey to Cape Crozier which Wilson himself called "the weirdest bird nesting expedition that has ever been made". Dr. Roberts includes Wilson's calm reference to his "misfortune" in the hut at Cape Crozier when some hot blubber "spluttered" into his eyes — a masterpiece of understatement which he nevertheless crossed out as immaterial before he handed the report to Scott. There is a full bibliography of Wilson's writings and of publications relating to him and his work, and a list of manuscripts and pictures with their locations.

The drawings and paintings reproduced are chosen from some 2,000 originals, most of them (including all the bird studies) housed in the Scott Polar Research Institute, Cambridge. The 97 full pages of illustrations comprise 316 sketches, mostly in colour. Many strike one at once as "alive". We watch the Adélies, for instance, swimming, porpoising, tobogganing, walking and asleep. Many of the sketches on the other hand are lovingly detailed studies of heads and feet. All of course are the work of a man who was a competent ornithologist as well as a skilful artist. All are carefully annotated and are completely satisfying.

The impression one gets from reading this book is of a great privilege — a talk with Wilson about the birds and about his sketching practice. One ends the reading of this enthralling book regretting that Wilson was not given time to carry out his 1905 plan to write a "popular"

book in which, he wrote to his father, "I would like to try my hand at freely illustrated chapters on birds, seals, penguins, blizzards, sledging, ski, sky-colouring and a host of other things, a sort of nondescript collection of things down south".

But here, none the less, is God's plenty!

L.B.Q.

TUATARA
ANTARCTIC ISSUE

The December 1967 issue (vol. 15, part 3) of Tuatara, the journal of the Biological Society, Victoria University of Wellington, is a University Antarctic Issue. With the exception of one review, the whole 182 pages are devoted to a series of authoritative articles by University men who have themselves worked in the Antarctic. They include graduates of the University of Canterbury as well as of the Victoria University of Wellington. There are numerous illustrations, charts and maps.

In addition to more general articles on V.U.W.A.E. by Dr. Hatherton and Prof. R. H. Clark, the contents comprise:

- The McMurdo Oasis: V. E. Neall and I. E. Smith.
- Penguins in High Latitudes: B. Stonehouse.
- Population Studies on the Weddell Seal: I. Stirling.
- Skua Studies: E. C. Young.
- Phytoplankton in Antarctic Lakes —A Problem of Survival: A. N. Baker.
- The Lakes of the McMurdo Dry Valleys: A. T. Wilson.
- Mummified Seal Carcases in a Deglaciated Region of South Victoria Land, Antarctica: R. E. Barwick and R. W. Balham.

DIE POLARFORSCHUNG. Pergamon Press (Australasia) Pty. Ltd., who, we were informed, could provide copies of Dr. H. P. Kosack's book on Polar Research, now inform us that they do not carry stocks of the book, which they would have to order from Germany for prospective purchasers.

SUB-ANTARCTIC SANCTUARY. Summertime on Macquarie Island. By Mary E. Gillham. 223 p. 42 drawings by the author and 32 photographs. A. H. and A. W. Reed (U.K., Gollancz). N.Z. price $4.25.

Dr. Gillham was one of four women who in 1960 pioneered the work of women scientists for A.N.A.R.E., the Australian National Antarctic Research Expeditions. Her book is a delightful mixture of acute observation of sub-Antarctic fauna and flora and the humorously related experiences of the first women to enter what had been for so long an ultra-masculine preserve.

Dr. Gillham begins by giving us a lively description of this "narrow, fogbound strip of land in the world's most desolate ocean" which is nevertheless today "one of the world's most remarkable wildlife sanctuaries", and an even livelier description of its grim and bloody early history. The voyage south and first impressions of the strange new island world are described with the same light but illuminating touch which reveals the keen observation and avid interest of the true scientist let loose in a fascinatingly different environment. We read of those "sluggishly heaving bundles of smell which we call sea elephants", of the rats whose "omnivorous tastes are probably equalled only by those of men and pigs", of the skuas dive-bombing with "the retractable undercarriage lowered", of the Royal penguin chicks "as mobile as their portly picaninny tummies allowed", or of the wandering albatrosses who "will challenge a man with gobbling noises, then empty the contents of their stomach, mixed with foul-smelling oil, in protest".

These acutely and humorously observed peculiarities are illustrated by the author's delightful sketches and an admirable selection of photographs.

As Mary Gillham is a botanist, the relatively abundant plant life of Macquarie Island is as acutely described as the animal life, though, with remarkable restraint, much less

lengthily. History comes every bit as lightly and entertainingly from a writer whose interests are so all-embracing, as in the story of the wandering albatross which flew the 3,000 miles from Crozet Island to Western Australia, "66 miles a day for 46 days", bearing a rough metal collar on which had been punched with a nail the message that 13 sailors had been stranded on the Crozets when the "Tarneres" was wecked there in 1887. "The albatross had done its best."

Mary Gillham is not writing down to a merely popular audience. This book is packed with information gleaned by a keen observant scientist, information of interest to scientist and layman alike. But the author avoids the unecessary use of discipline-jargon, and, apparently quite naturally, enlivens her descriptions with a bubbling wit. The result makes delightful as well as informative reading.

L.B.Q.

PUBLISHED IN NEW ZEALAND

N.Z. OCEANOGRAPHIC INSTITUTE Echinoderms from Cape Hallett, Ross Sea. D. G. McKnight. N.Z. J. mar. Freshwat. Res. 1967 (Cont. 204).

New Foraminifera from the Ross Sea, Antarctica. J. P. Kennett. Contr. Cushman Fdn. Foram. Res. 18 (3): 133–5, 1967 (contr. 213).

The Fauna of the Ross Sea. Pt. 5 General Accounts. Station Lists and Bethnic Ecology. John S. Bullivant and John H. Dearborn. Bull. N.Z. Dept. Scient. Ind. Res., 176, 1967 (mem. 52).

Water Masses and Fronts in the Southern Ocean South of New Zealand. Th. J. Houtman. Bull. N.Z. Dept. Scient. Ind. Res., 174, 1967 (mem. 36).

Charts. Pakaki Bathymetry. C. P. Summerhayes. Oc. Chart Series 1: 1,000,000.

Auckland Islands Bathymetry. C. P. Summerhayes. Island Chart Series 1:200,000.

"CELLULAR INJURY AND RESISTANCE IN FREEZING ORGANISMS".

International Conference on Low Temperature Science, Vol 2. Eizo Ashhina, Editor. 1967. The Institute of Low Temperature Science, Hokkaido University.

This volume contains papers presented at the Conference on Cryobiology which was a section of a widely representative International Conference on Low Temperature Science held at Sapporo, Japan, in 1966. The principal topics covered are the physical changes in freezing aqueous systems; mechanisms of injury and ice formation; freezing injury in various organisms; biochemical aspects of freezing injury; and frost hardiness in plants.

The whole field of cellular injury and resistance is one which is attracting more and more attention and this collection of papers is extremely valuable in presenting a review of the present state of the art.

Since this is a collection of papers delivered to a specialist conference, almost all of the papers demand a considerable background knowledge and familiarity with the subject, which puts the lay reader at a disadvantage. This book therefore is of more particular interest to specialists.

Although there are some excellent contributions in the book, it is disappointing that there is virtually nothing on freeze damage to cells at the ultrastructure level, .e., to cell organelles, cell membranes, etc. It is at this level of cellular organisation presumably, that the cell first begins to be irreversibly damaged by ice crystal formation, and it would have been useful if this aspect had received more attention. All the more so, since the freeze-etch technique is rapidly becoming one of the more important methods of ultrastructure research in electron microscopy.

M. C. Probine.

Adrian Hayter's **THE YEAR OF THE QUIET SUN** is to be published by Hodder and Stoughton in August. Mr. Hayter was Leader Scott Base in 1965.

REVERED DOCTOR DIES DURING RELIEF

Dr. Z. Soucek, the headquarters medical officer of the Australian Antarctic Division, died at Macquarie Island on Christmas Eve.

Dr. Soucek, 51, of Glen Iris, Victoria, was visiting the island as deputy leader of the annual relief expedition. He was travelling in an amphibious vehicle from the store to the relief ship when he collapsed. The station medical officer, Dr. John Evans, who was with him, treated him. But Dr. Soucek died shortly after having been admitted to the station surgery.

Dr. Soucek had been with the Antarctic division of the Department of External Affairs for eight years. He spent a year at Macquarie Island and two years on the Antarctic continent at Wilkes Base.

TRIBUTE

The former Director of ANARE, Dr. P. G. Law, in paying tribute to Dr. Soucek, said: "He always displayed those most desirable qualities required on Antarctic expeditions — courage, responsibility and good humour.

"He came to Australia in 1950 after a remarkable escape when the communists took over Czechoslovakia.

"We will miss him."

EYES NORTH

New Zealanders will have a special interest in the British Trans-**Arctic** Expedition which set out from Point Barrow, Alaska, early in February, on what has been described as "the last great Polar trek".

Leader of the four-man team is **Wally Herbert** (34). Born in England, brought up in South Africa and Cairo, and then practising as a surveyor in England, Wally had two years with the Falkland Islands Dependency Survey, and then with a Scottish expedition in Spitzbergen. In 1959 he selected and brought out to New Zealand a team of N.W. Greenland dogs before going south with the New Zealand expedition later that year. He was a member of the New Zealand southern field party in the 1959–60 summer, covering a wide area of mountainous country north and south of the Nimrod Glacier. He wintered in 1960 at Scott Base, and then led the field party which worked eastwards along the country south of the Ross Sea, a journey which culminated in the descent of the Axel Heiberg Glacier, untrodden since it was Amundsen's route to the Pole in 1911–12.

Wally has seldom gone the easy way on any journey, and he and his companions are now off on their long and perilous journey of 3,800 miles across the frozen Arctic Ocean with four dog teams and with no modern aids but radio and air-drop of supplies. From Alaska they will head north for 2,300 miles to the Pole and then south for 1,500 miles to Spitzbergen, north of Norway. It is expected that the journey will require 16 months. During the long Arctic night they will be drifting, they hope, across the North Pole.

A.N.Z.A.A.S.

The 40th Congress of the Australian and New Zealand Association of Science was held at the University of Canterbury, Ilam, Christchurch, on January 24–31.

On Friday, January 26, at 8 p.m., there was a public lecture by Prof. F. W. Shotton, F.R.S., of the University of Birmingham, on *"What was the Ice Age?"*

On Tuesday, January 30, at 2 p.m., there was an *Antarctic Research Programme* for "Junior A.N.Z.A.A.S." (interested senior secondary school pupils), and at 8 p.m. a public lecture by Dr. Philip Law, late Director of A.N.A.R.E., on *"Antarctic Research.*

An A.N.Z.A.A.S. Congress in New Zealand is a rare event. The last time a Congress was held in this country was 11 years ago.

ABOUT THAT ICE

Such varying figures have been published regarding the mass of the Antarctic ice-sheet and the probable result if it were melted, that some conclusions by Dr. A. Kapitsa, who is probably the world's leading authority on the subject, should be of general interest. In an article in "Smena" in November last, Dr. Kapitsa said:

"The total volume of Antarctic ice, it appears, equals 24 million cubic kilometres. If such a mass of ice were to melt, the level of the seas would be raised 56 metres (184 feet) with catastrophic results to the world. But even without catastrophic melting of the ice, a rise of two or three metres in the level of the sea would cause enormous trouble to coastal towns and ports."

After explaining how scientists endeavour to establish whether the Antarctic ice is growing or diminishing in size, Dr. Kapitsa goes on:

"But one must not hurry to conclusions. Both on the surface of the ice mass and in bores the glaciologists measure the temperature of the ice which varies according to depth. They have so far succeeded in measuring these variations only down to a depth of 100 metres. The data obtained make it possible to calculate how the temperature varies throughout the entire thickness of the ice-cap. And this has unexpectedly revealed that on the very bottom where the thickness of the ice-cap reaches several thousand metres, the ice can melt under the influence of heat emanating from the earth's crust."

"Whither does the water from this melting process disappear?"

If, Dr. Kapitsa says, it is squeezed by ice pressure out to the extremities of the Antarctic continent and flows into the ocean, this must affect the total amount of ice. But its exact proportions are not well known to us at all.

Moreover for years, scientists were not agreed whether or not the earth's crust sags under the weight of the Antarctic ice. Dr. Kapitsa says that recent geophysical research has proved that the ice-cap does compress the earth's crust. "Much still needs to be done in this direction, for Antarctic research has really only just begun. Many secrets are still hidden in its icy midst. Each new discovery in the Antarctic is not only improving the knowledge of our planet but is also a step along the path of the battle with the elements. We must not only become acquainted with the laws governing the development of our natural environment, but learn how to forecast those processes."

VOICE OF A VETERAN

Veteran Mikhail E. Ostrekin, who led the first, seventh and tenth Soviet expeditions to the Antarctic, stated in an interview published on December 3 that "gold, iron, platinum and coal" had been found in the Antarctic. He believes that a solution will be found for the problems which will be encountered in getting the minerals out. He envisaged regular shipping routes and air lines.

Recalling experiences at Vostok, he said that this station had a mean temperature of −80°C. (compared with Mirny's relatively balmy −39°). The low temperature enforced slow bodily movements. The lowest recorded temperature was −88.3°C. and on the warmest day the thermometer registered −21°C. During the 10 years since Vostok was established, 100 men had braved its rigours. During the last few years they had included an American scientist.

"I WAS IN SCOTT'S PARTY"

Thirty-six people will be able to say this, 14 of them women. They are a party of English tourists led by Peter Scott (Captain Scott's son, the noted naturalist), which spent five weeks on the "Navarino" in Antarctic waters south of Chile during the 1967-8 season.

"ANTARCTIC"

is published quarterly in March, June, September, and December. Subscription for non-members of the Antarctic Society, $2.50. Apply to the Secretary, New Zealand Antarctic Society, P.O. Box 2110, Wellington, New Zealand.

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

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

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

The New Zealand Antarctic Society

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

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

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

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

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Printed by Universal Printers Ltd., 21-23 Allen Street, Wellington.