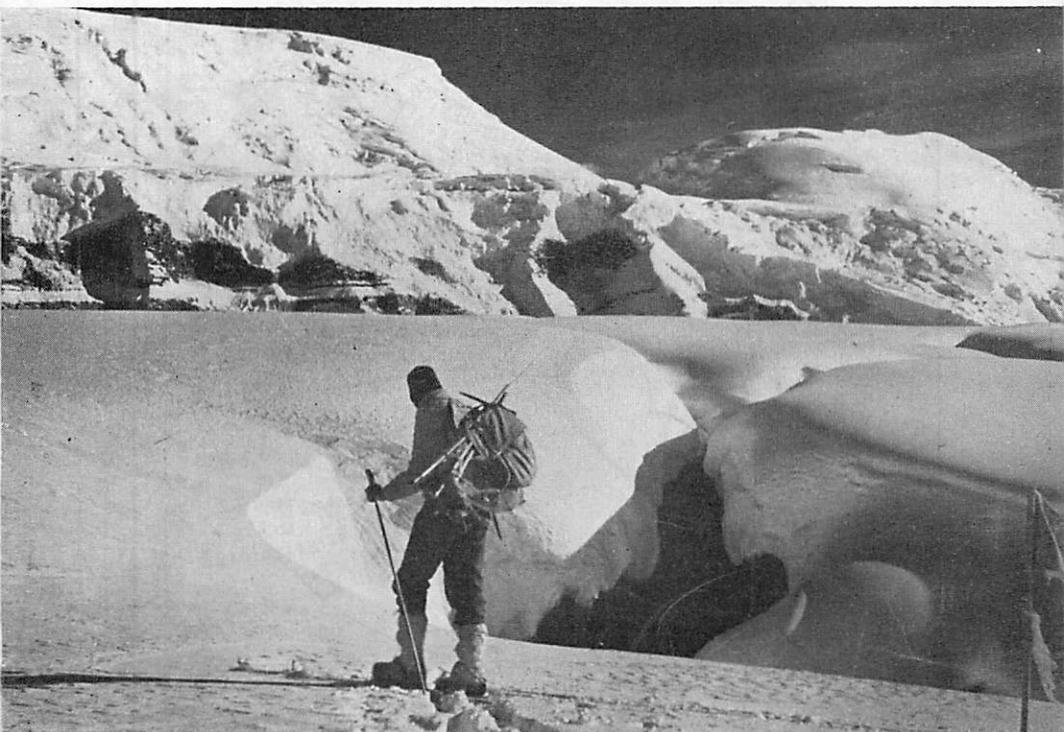


ANTARCTIC

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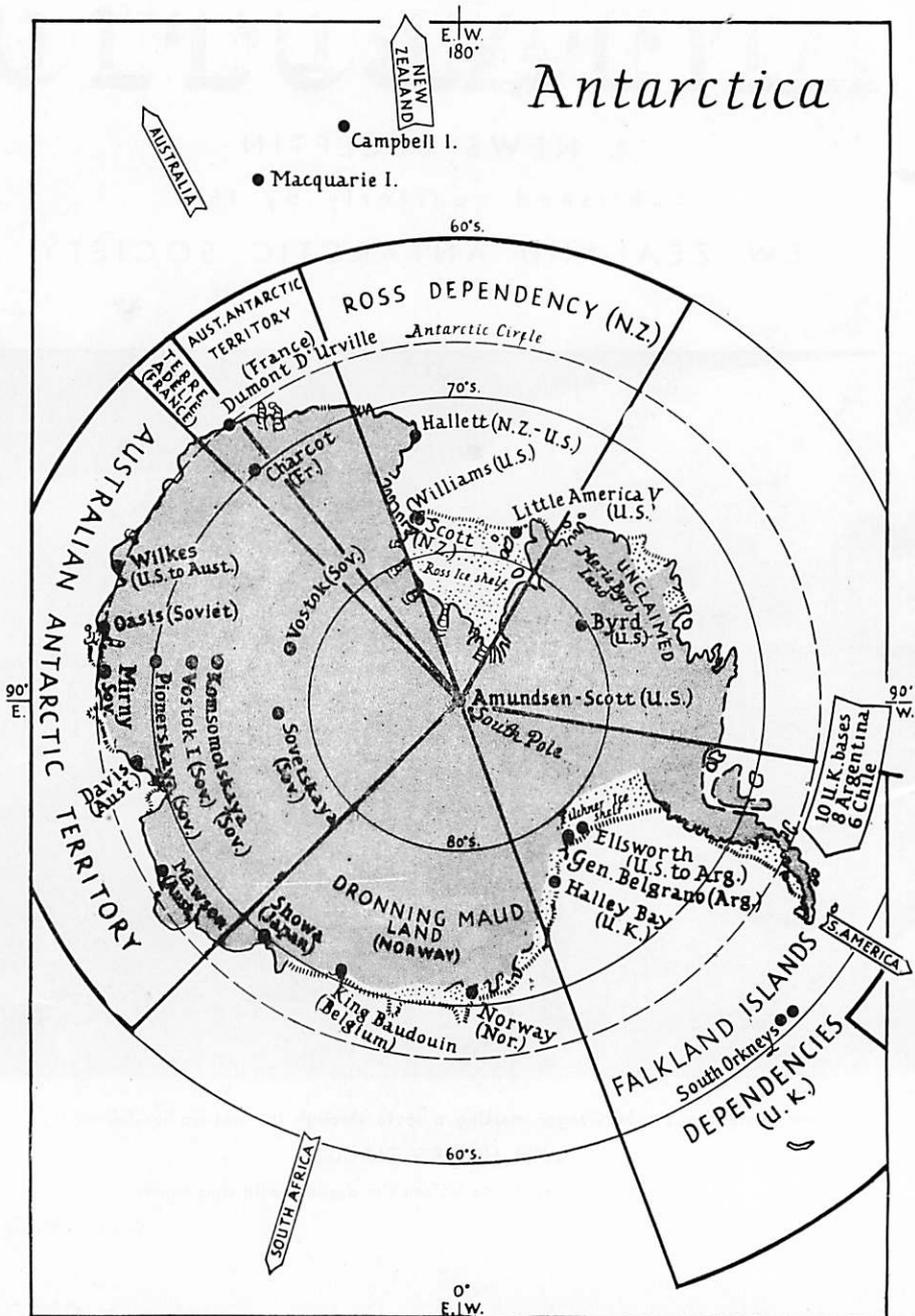


New Zealander Vic McGregor marking a route through the bottom ice-fall of the
AXEL HEIBERG GLACIER

during a foot reconnaissance before the descent with dog teams.

Photo W. W. Herbert.

Antarctica



"ANTARCTIC"

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THE BYRD MEMORIAL IN WELLINGTON, N.Z.

This bust of Admiral Richard E. Byrd, the central feature of the striking memorial in the form of an Arctic tent which stands on the crest of Wellington's Mount Victoria, facing across the sea to the Antarctic, was unveiled on March 11 by the Prime Minister of New Zealand (Mr. K. J. Holyoake), the Commander of Operation Deep Freeze (Rear Admiral Tyree) and Mr. A. Leigh Hunt, a close personal friend of Admiral Byrd and the prime mover in the erection of the memorial.

"Dominion" photo.

IN MEMORY OF SCOTT

In addition to the ceremonies described or mentioned in our last issue commemorating the 50th anniversary of the death of Captain Scott and his companions, a simple but moving tribute was paid on March 27 at the Scott statue in Christchurch, New Zealand. An address was given by the Bishop of Christchurch, and

wreaths were laid by Rear Admiral Tyree, the Mayor of Christchurch, and the Chairman of the Christchurch branch of the New Zealand Antarctic Society.

Among those present were three members of the crew of Scott's "Terra Nova", Messrs. M. McCarthy, W. Burton and W. McDonald. All live in or near Christchurch.

SCOTT BASE TO BECOME A PERMANENT STATION

The New Zealand Minister of Scientific and Industrial Research, Mr. Blair Tennent, announced on May 3 that an expenditure of £30,000 had been authorised in order to convert Scott Base from an expeditionary headquarters to a permanent scientific station.

This, said Mr. Tennent, was a logical final step in the development of New Zealand's Antarctic base.

Scott Base was built in the summer of 1956-57 to meet the limited requirements of the Trans-Antarctic Expedition and the International Geophysical Year, both of which concluded in 1958. When the base was designed, the actual site had not been determined, and the operational requirements demanded that it be made as compact as possible. Later when it had been decided that New Zealand should continue work in the Antarctic, a bigger power-generator plant was installed in a new building.

A year ago the Government made a policy decision to remain in the Antarctic "for at least five years". This implied the improvements now authorised in order that the base could function as a permanent station. Last summer the Minister himself visited Scott Base to see for himself the conditions under which our men live and work. This convinced him that the facilities and space available left much to be desired for a permanent station.

BETTER LIVING QUARTERS

The main features of the alterations and extensions are an extensive rearrangement within existing buildings, extensions to the science and sleeping huts, and the erection of a large heated garage, also accommodating power generation plant. When completed at the end of next season the base will have much improved space for messing and living quar-

ters. Each man wintering over will have a cubicle 8 ft. by 9 ft. instead of a meagre 20 sq. ft. of privacy. An administration centre comprising leader's office, radio room, post office and a recreation/reception room of 260 sq. ft. will have been created. The extension to the science hut will give additional space for the current programme, provide for the photographic laboratory transferred from elsewhere in the base and a small biological laboratory.

NEW SEISMIC EQUIPMENT

An important feature of the improved science facilities is a new seismograph building remote from the base and an enlarged recording room in the extended science hut to house seismic equipment, worth 25,000-30,000 dollars, being given to D.S.I.R. by the U.S. Coast and Geodetic Survey. This equipment is identical to that already installed at Kelburn, Wellington. The station at Scott Base will be another link in the world chain of 120 identical stations being established by the United States to standardise and thus improve earthquake recording on a global basis. Two more of these stations for which New Zealand has some responsibility are at Samoa and Hallett Station, Antarctica, where the equipment will be operated by New Zealanders.

Another feature of the building programme is the new garage. This will be specially heated to facilitate garaging and maintenance of vehicles during the winter, and two

15 Kw generators from other parts of the base will be installed.

Toilet and ablution facilities will be substantially improved. Other features will be a hobby darkroom for Antarctic winter photographers; a cool store to raise the temperature for the storage of fresh vegetables, eggs and certain types of food and beverages; a waste disposal system which first strains and then beats liquid waste before sending it to the tide crack between sea ice and land ice, 60 yards away, through an air heated pipe; and finally a 5,000-gallon fuel storage tank to reduce the task of extracting 44-gallon drums from ice and snow during the Antarctic winter.

ARMY TEAM TO CONSTRUCT

All these works are being carefully planned at high pressure in Ministry of Works by a team of engineers and draughtsmen, under the experienced guidance of Mr. F. W. Ponder, the architect of Scott Base. Every item has to be accurately planned and prefabricated in New Zealand. The new buildings will be pre-erected in New Zealand, marked, dismantled, and crated before leaving New Zealand next season. An Army team of engineer builders under a Ministry of Works overseer will undertake the construction programme. The whole programme must be accomplished during the short summer of eight to ten weeks.

Ready For Winter At Scott Base

EARLY BREAK-UP

Warm sea currents, ocean swells and off-shore winds caused the sea-ice in McMurdo Sound to break up earlier than usual this year. This, combined with gale force winds, carrying heavy snow drifts often reducing visibility to nil, seriously interrupted both air and shipping movements in late February and considerably delayed the evacuation of men. On February 22 no aircraft had arrived from New Zealand for over a week. However, the last of the summer personnel left for New Zealand on March 3 by United States ice-breaker, leaving thirteen men under Athol Roberts to man Scott Base for the winter.

During March, carpenter McKenty added 14 feet to the solid timber tunnel, already 26 feet long, which leads to the snow cave a quarter of a mile from base. There the fresh meat and vegetables for the base are stored. Last winter, despite all precautions including long flagged bamboo poles, the cave was temporarily lost under 20 feet of snow after a storm.

STRAIN GAUGE

On March 22 at 11.45 a.m. Hewson and Pain with a dog-team set out to examine the strain gauge set up on the ice-shelf 19 miles east of Scott Base by G. Matterson in 1959-60. The gauge consists of markers set half a mile apart and running for four miles, and is intended to measure the movement of the ice-shelf. It is situated between Cape Mackay on Ross Island and the northern tip of White Island.

Visibility was nil for the first few miles and very cold as the two men skied alongside the sledge. They set up camp after a day's run of 17 miles. The temperature was -34° F. Next morning they came squarely on to the end marker.

After measuring the position of the markers they left for base at 2.30 p.m. on the 24th. The lead dog "Butch" got on to his outward tracks and led the team at a run all the way home, covering the 19 miles in four hours.

GETTING DUG IN

Early in April Leader Athol Roberts reported that the 13 New Zealanders at Scott Base were digging in for the

long winter night. Vehicle lights were being carefully checked and new lights placed in strategic positions such as over the hatches of the snow-melters. One strong light can be seen for miles—on a clear night—in every direction. Bamboo poles with flags and reflector-tape were set in position along frequently-used routes, e.g., to the dog-lines, to the American base and to the bleak 500-foot-high Arrival Heights auroral radar station, where there are sleeping bags and food supplies for a month—"just in case".

Again this winter a series of seminars is being held, speakers alternating between the American scientists and the thirteen New Zealanders.

KEEPING THE LINES CLEAR

By mid-April, with temperatures dropping down to the minus 40s, with only 10 hours of daylight and with the winter snows building up around the Base, the task of policing and checking the vast aerial farm was becoming a more and more unpleasant chore.

The total of 21 masts (11 for communications and 10 for scientific use) spread over a vast acreage must be checked regularly, especially straight after a storm.

The effects of a 50-knot wind on the night of April 8 were indicative of the difficulties. Windblown snow piled up and aeriels were festooned with layers of ice. All stays on the 120 aeriels must be checked closely. On his return to base the radio officer's beard was matted with ice.

This is just one of the many outside jobs that must be done throughout the year, but a very essential one to keep the scientific programme going and keep communications open with New Zealand.

Solar flares made communications a little difficult and on three occasions the base was unable to make contact with Awarua Radio at scheduled times. Radio-telephone circuits also fell out on occasions but

this is quite common for this time of the year.

TOM COUZENS REMEMBERED

On Anzac Day (April 25) at a simple ceremony in front of the flagpole, Chaplain Young from McMurdo spoke of the men who have given their lives to unveil the Antarctic. He made special reference to New Zealander Lieutenant Tom Couzens, who was killed when his sno-cat plunged 100 feet into a crevasse on the Ross Ice Shelf in 1959. As a wreath was laid in front of the plaque erected in his memory beside the flagpole, the Last Post was sounded, and as the flag was lowered for the winter a trumpeter played "Day is Done".

WINTER CLOSES IN

During April most of the dogs were given a run. Those not out with sledges, including the pups, were given a run at base.

A telephone has been installed at the Arrival Heights radar station, where the two men making the periodical visit may at any time be marooned.

The final helicopter flight of the season was made available by our American friends on April 2, when a flight was made to the Walcott Glacier. The larger New Zealand vehicles had by the end of April been stored in the hangar for the winter.

Enough meat for the winter had been brought into the base buildings from the snow cave in case the cave should be snowed up.

The National Historic Places Trust plaque on Scott's old 1902-04 hut at Hut Point, which was recovered after some vandal had removed it a year or so ago, was again placed in position and the hut carefully battened down for the winter.

On May 8 there was a sudden temperature rise from -35°C . (-31°F .) to -12°C . ($+10.4^{\circ}\text{F}$.)

BRINGING IN THE OIL

In a 20-knot wind, Timms with the D4 tractor and McKenty with the Ferguson front-end load went off at

9 a.m. to re-fuel by collecting 44-gallon drums from the dump 400-500 yards away. They loaded 12 drums on to each of three sledges. By 11 a.m. the wind had risen to 50 knots and they were still at the dump. By noon the wind was "hitting 60" and they were surrounded by swirling snow.

They found they could not use the blade and the drift was building up fast. It was impossible to tell if they were on the road, or going in the right direction. Soon the Ferguson was bogged and temporarily abandoned, while the two men forced their way on with the "dozer". McKenty tried walking in front but Timms could not see him. Then they ran into a search party setting out with ropes to their assistance—20 yards from the base. The two men's faces were sheeted in ice. The Ferguson was later recovered.

BIG BLOW

At 2 a.m. on May 28 the worst storm this winter struck Scott Base. Winds that topped 98 knots wrenched at the base and buildings shuddered. Lumps of snow that sounded like cannon fire battered consistently for admittance and fine snow poured through every crack which air could penetrate.

An escape hatch situated in the photographic darkroom blew open, and before it was discovered, the room was coated with inches of snow round the walls, ceiling and floor. Snow infiltrated into some of the other huts, and the covered way connecting the various buildings had a depth in places of two feet.

The telephone line to the American base, McMurdo, went dead, cutting communications there, but the New Zealanders still had a radio link with their homeland.

SOON OVER

The storm blew itself out in 18 hours. It was one of the heaviest recorded at Scott Base for some

years. The wind speed instruments recorded up to 95 knots, but the needle was blown right off the scale and winds at times were estimated at more than 100 knots.

The dogs weathered the storm fairly well, though some required digging out. One, which had been sheltering under a five-ton sledge, was dug out of six feet of snow, fit and well.

An American Otter aircraft, parked near Scott Base for the winter, was wrenched from its moorings, blown a few hundred yards until it became jammed in hummock pressure ice, and suffered considerable damage.

VANISHED

A transmitting aerial was blown down and a cable to scientific whistler equipment broken. Mirrors on top of the auroral building had the silvery stripped by blowing snow, and other equipment stored outside vanished. Timber which had been stacked to prevent drift was blown into a jumbled mass, and it is possible that other damage not yet discovered has occurred.

Men worked through the night digging out equipment, continuing during the afternoon and evening of the following day until all were dog tired.

With temperatures at minus 40 degrees Centigrade and complete darkness, working conditions were not pleasant.

CANADIANS BUY "ENDEAVOUR"

A Canadian company has purchased the Navy's surplus Antarctic support ship H.M.N.Z.S. "Endeavour."

Last year it was decided that Endeavour could not be used again in the Antarctic pack ice without an extensive and uneconomic refit.

New Zealand is at present negotiating with the United States Government for a suitable replacement.

University of Canterbury Zoologists Study Penguins and Seals

by BERNARD STONEHOUSE

From October 1961 to March 1962 the University of Canterbury, New Zealand, was represented in Antarctica by a small unit of zoologists.

The party of four (Warren Featherston, Murray Smith, Terry Jacobs and myself) began a five year programme of studies on Weddell Seals, Adelie Penguins, McCormick Skuas, marine fish and invertebrates, and fresh-water fauna in the McMurdo Sound region.

We lived for the first few weeks in Shackleton's old hut at Cape Royds; later Featherston and Smith transferred to Scott Base, while Jacobs and I completed our observations and returned home early in December. Our work in the field was made possible by aircraft of the U.S. Navy. Antarctic Division of the DSIR helped us in many ways, both in planning and through the personal kindness of Mr. Athol Roberts, leader at Scott Base. To these authorities, and to the University Grants Committee which provided our funds, we are extremely grateful.

STILL MUCH TO LEARN

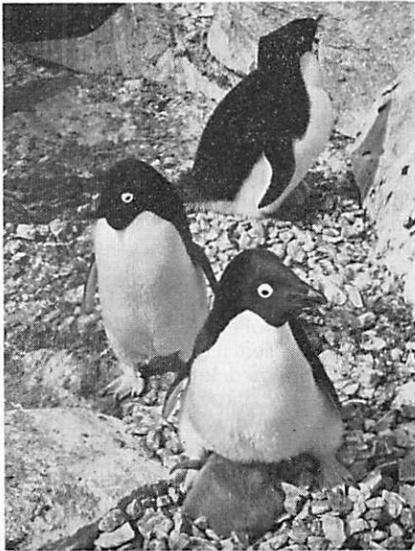
Every amateur and professional biologist who has visited Antarctica during the present century has made at least some small contribution to our knowledge of skuas, seals and penguins. Yet by modern standards Antarctic animals are practically unknown species; even the most prominent and best-known vertebrates, the Adelie Penguins and Weddell Seals familiar to every explorer, require far more study and investigation before we can begin to understand their curious way of life. We know little of their growth rates, causes of mortality, feeding, or phy-

siological adaptations to cold and to deep water. We know when and where they breed, but do not know why they choose certain situations and times of year in preference to others. We cannot at present set out to describe their patterns of aggressive and reproductive behaviour, except in the broadest terms.

Most important of all, we do not know how much our own activities are interfering with those of either species, for whose wellbeing posterity will hold us responsible. How many seals can we kill for dog-feeding without seriously depleting stocks? How often can we visit colonies of penguins and other birds in the breeding season, without seriously upsetting the delicate balance of their economy? What conservation measures must we take to avoid the devastation which so often accompanies man into new regions?

A FIVE-YEAR PLAN

The aim of our work during the next five years is to answer some of these questions, and as many others as we can think of while the research is in progress. We plan to place in the field each year a team of graduate biologists under the leadership and guidance of one or more experienced workers; the research will follow a plan based on ecological studies in other parts of the world. By covering the same ground year after year we shall hope to find how one season differs in detail from another, how numbers and age-groups fluctuate in our study



populations, how breeding times and breeding success vary. Continuity of studies is sadly lacking from Antarctic research in biology, which has so often suffered in contest with the needs of other, more aggressive sciences. Working as an independent unit, we hope to avoid some of the difficulties which have faced biologists attached to large, multi-purpose expeditions.

Our research last spring began with the first arrivals of Adelie Penguins at the small Cape Royds colony. Observations by R. Taylor (of Animal Ecology Division, DSIR) and others during the past few seasons provided a pattern for comparison, and a number of penguins which Taylor banded as breeding birds in 1959 provided a corps of known experienced breeders whose activities were of particular interest during the early part of the season.

NEST SCRATCHING

Watching courtship, nest-building and laying, I had an opportunity of confirming points of behaviour

which I had first noted fifteen seasons ago on colonies in Graham Land, but for which more evidence was required before descriptions could be published. One example was nest-scratching, a positive behaviour movement by which the bird shapes its nest scoop both before and after stones are carried to the site. This has apparently not yet been described as part of courtship behaviour in the Adelie Penguin, although the business of carrying and stealing stones is well described and publicised. It is, however, an important part of their inheritance, and one which helps to link their behaviour with that of their more northerly relatives, the Gentoo Penguins.

Later in the season I was able to measure many hundreds of eggs for comparison with those of other colonies and other years, and investigate the circumstances in which Adelie Penguins replace eggs lost from the nest during the first few hours of incubation. All this work had to be done with as little disturbance to the colony as possible. The census this year suggests strongly that the Cape Royds colony is at present declining, and from now onward we shall make every attempt to ensure that the birds are left in peace at critical periods in their breeding cycle. Cape Royds is visited regularly during the summer by servicemen and VIPs from McMurdo Sound, who will be as interested as we are in seeing that this colony, the most southerly in Antarctica, is preserved and maintained.

THE WEDDELL SEAL

Work on Weddell Seals began in November, when Murray Smith and Warren Featherston were flown out to join the party at Cape Royds. Smith was concerned mainly with the anatomy, dimensions, and breeding biology of the animals, and

Featherston was making a quantitative study of the intestinal parasites which infest them. The two together devised a successful programme of killing and dissection which has provided a mass of specimens and useful primary data. Most of the material was collected within a few miles of Scott Base; in this we worked in co-operation with the base leader, Athol Roberts, who required a considerable amount of fresh meat to feed the sledge dogs throughout autumn and winter. We were able to make use of seals which were in any case marked for killing.

In this field our work has provided the foundation of a broader survey;



Weighing a Seal.

with the help of aerial reconnaissance, marking and banding techniques, measuring and weighing under anaesthetic, and censuses throughout the year, we hope eventually to understand the structure of the McMurdo Sound seal population, and so gain an idea of how many animals may be culled annually without depleting the stocks.

This is a topic in which Antarctic Division is extremely interested, as fresh seal meat is by far the most satisfactory food yet found for sledge dogs. Featherston's work on parasites is at first descriptive, but he is also attempting to assess rates of infestation and may eventually be able to find the intermediate hosts in which early stages of the tapeworms are found.

During our short weeks at Cape Royds we were able to dredge and take hauls of plankton from the edge of the sea ice, which from mid-October onward lay just over a mile north of the cape and extended as far as we could see across McMurdo Sound. In addition, the fresh-water pools among the cinder-slopes of the cape gave us many instructive samples of invertebrate life; both topics now await interested students who would be prepared to work for a season or more on the ecological problems involved. Next year we hope to have a laboratory and living hut, with better equipment and living conditions, to help us in our work at Cape Royds.

BELIEVE IT OR NOT

Ian Richards was on night-watch at Scott Base late in May when at 3.30 a.m. the inter-house telephone rang. He lifted the receiver and heard what he describes as "a lot of strange noises". Fearing that someone had taken ill, he began a check of each hut. All seemed well until he reached the workshop and ablutions hut, where the only residents were a female husky, Suzie, and her pup. In the workshop was the pup, but no Suzie. The door to the ablutions was closed. Richards, passing through, found Suzie, who joyfully dashed back to her offspring. She had gone through herself, somehow shutting the door behind her, had got the receiver off, and had rung the night watchman.

N.Z. LEADERS FOR NEXT YEAR

Leader at Scott Base for 1963 will be **Lieut.-Col. Ronald A. Tinker, O.B.E., M.M., M.C., F.R.G.S.** Colonel Tinker, who is 48 years of age, was educated at Addington School, Christchurch, and at Christchurch West High School. After a brief period of office-work he headed for the open country, the high country. His favourite sports were mountain climbing and deer stalking.

On the outbreak of the second world war he joined the First Echelon, was seconded to the Long Range Desert Group, and served as navigator over much previously unexplored desert country. He was commissioned in 1942, and was leading L.R.D.G. units in the Western Desert until the end of the North African campaign.

He now took part in clandestine operations with small boats in the Dodecanese Islands and against the Germans on the Greek mainland. When the Dodecanese Islands were captured by the Germans he escaped to Turkey and made his way back to Palestine. From Italy he carried out boating operations against German sea and land communications in the Dalmatian Islands and on the Jugoslav mainland. He then led a force which was parachuted into Albania.

Back in New Zealand he joined the regular Force and served as Intelligence Officer with the Fiji Military Forces. He formed the Fiji battalion for Malaya, and commanded the battalion for two years. He has been Chief of Staff, Southern Military District, since 1958.

Deputy Leader at Scott Base for the 1962-63 summer will be **W. R. (Ray) Logie** of Dunedin. Mr. Logie is an experienced Antarctic man, having spent the whole of last year as maintenance officer (mechanical) at Scott Base, staying on for 16 weeks to serve as traverse-engineer with the American Roosevelt Ice Dome Project, about which he has written elsewhere in this issue.

TEAM FOR 1962-63

The Antarctic Division, D.S.I.R., is advertising for men, in addition to the Leader and Deputy-Leader, for the wintering over parties at Scott Base and Hallett Station 1963, and for the parties to operate during the 1962-63 summer. Fourteen men will winter at Scott Base. In addition to the Leader, Senior Scientist, four scientific officers or technicians, maintenance officers (mechanic, electrical and carpenter), radio officer and cook, two men from the summer geological and survey expedition and also a biologist will stay on at Scott Base for the winter.

FIELD WORK

The principal field work for next summer will be the survey and mapping of the Terra Nova Bay-Wood Bay area of the Victoria Land coast and hinterland in approximately 75° S., some 250 miles north of McMurdo Sound. This area is notoriously difficult of access from the sea, and an expedition which planned to work here in the summer of 1958-59 was unable to land despite extensive United States assistance. Two four-man parties will this year be in the field.

A biological party of two biologists and two biological technicians will carry on with the study of the bird and seal populations and primitive plant life at Cape Adare, Hallett Station and Ross Island. One of these men is to winter over next year at Scott Base.

Oceanographic work will also be carried out if shipping schedules permit and for the summer period an additional cook and a storeman are required.

UNIVERSITY TEAMS

Once again the **Victoria University of Wellington** will be in the field, this summer extending the work done in previous years in the Dry Valley and other ice-free areas. A five-man team will work in the ice-free areas near the mouth of the Darwin and across

the Carlyon Glacier, which drain the mountainous country skirting the Victoria Land coast some 150 miles south of McMurdo Sound. The work will comprise geological mapping and a topographic survey, as well as glaciological and other work.

The University of Canterbury will again send a biological party south to work at Cape Royds, where it is proposed to erect a prefabricated laboratory and living hut, and possibly at Cape Crozier. The main research will be into the reproduction biology and parasites of Weddell seals and population trends in the Adelie penguin rookery at Cape Royds. Studies will also be made of the McCormack Skua, and plankton and sea-bottom sampling are also planned.

These University expeditions are financed by the University Grants Committee, with logistic support from the Antarctic Division D.S.I.R. and from the U.S. Navy.

WEATHER-STATION DUTY

Weather reports from a New Zealand warship will guide United States Deep Freeze aircraft on their way between New Zealand and the Antarctic again next summer.

New Zealand has again offered the frigate H.M.N.Z.S. "Rotoiti" for weather station duty. This involves three 10-day periods in October, November and February on station in the sub-Antarctic, 1200 miles to the south of New Zealand, sending weather reports to Deep Freeze headquarters in Christchurch.

The United States Navy keeps a weather ship there most of the summer season, but it must come back to New Zealand at reasonable intervals. Until last summer flying operations to the Antarctic ceased during these stand-down periods. To avoid this the New Zealand Government agreed to make a New Zealand ship available and the "Rotoiti" was

NEW ZEALANDERS VISIT MAWSON'S OLD BASE

During February two New Zealand D.S.I.R. scientists, A. Hanley and A. L. Burrows, both of Geophysics Division, travelled by invitation of the U.S. Navy on U.S.S. "Burton Island", which was en route to land two American scientists at Commonwealth Bay, Adelie Land, to make V.L.F. whistler observations.

The vessel left McMurdo on January 27, arrived off Cape Hallett on February 3, and rounded Cape Adare on February 5. A sudden recall to McMurdo, due to break-up of the sea ice there, delayed the final departure for Adelie Land till February 10, and the arrival at Commonwealth Bay till February 14. A magnetic survey was made throughout almost the whole of the voyage.

Approximately at the centre of Commonwealth Bay is Cape Denison, a small low promontory about a mile long by half a mile wide, which was the site of Mawson's main base in 1912-13. Estimates of the position of the South Magnetic Dip Pole had placed it somewhere in the vicinity of this cape. The plan for its location was for initial measurements at Cape Denison and then landings by helicopter at a series of points approximately ten miles apart to east and west.

On February 15 despite the usual "Home of the Blizzard" weather, Hanley and Burrows were flown by helicopter to the Cape, with equipment for their magnetic observa-

selected and fitted with special meteorological equipment.

The Southern Ocean is difficult for ship operation, seas are high, and gale force winds are common, but in spite of this the New Zealand ship provided what the Americans describe as "an outstanding performance in all respects".

tions. They found the old magnetograph hut in good condition and ice-free. Painted on the inner door was a message from "R.B. 18.12.13" giving instructions to future magnetic observers, with a warning "Beware of ice from roof falling on instruments." (R. Bage was magnetic observer on Mawson's expedition throughout 1913.)

Next morning the blowing drift had disappeared and the main 1912 hut was visible 400 yards away, but it was full to the roof with ice. As a two-man American "whistler" party now needed the magnetograph house for shelter, Burrows and Hanley were flown back to the ship; but they made measurements inside the house and, later, at Cape Hunter, ten miles to the north-west. These measurements showed the location of the dip pole to be roughly west of Cape Denison and south-east of Cape Hunter.

The surface wind was so high that landing and working on the crevassed ice of the mainland was impracticable, so the New Zealanders were flown by helicopter on February 18 to a flat-topped iceberg approximately at the third point of the Cape Denison-Cape Hunter equilateral triangle. They were provided with a canvas wind-break, and a successful measurement showed that this time the dip pole lay to the south. Further measurements were made at both capes, and the tentative conclusion reached that the dip pole appears to be somewhere in the south-western half of Commonwealth Bay.

"Burton Island" sailed on February 22 and reached Lyttelton on March 1. The two New Zealanders enjoyed the constant co-operation and hospitality of the Captain, officers and the whole ship's company.

ENGINE-UIITY

After years of rough haulage over hard volcanic rock, the tractor-drawn sledges used to bring in the vital snow for water at Scott Base have become unrepairable. The position was becoming desperate. An American weasel abandoned out on the Ross Ice Shelf was towed into Scott Base, where maintenance engineer B. Mills and carpenter McKenty transformed it into a light truck on tracks, attractively painted in black and lemon with a Kiwi prominent on either side. Now all is well again.

HOW HIGH IS EREBUS?

Since its first sighting by the British expedition of Sir James Clark Ross in 1941, the elevations assigned to Erebus have differed widely. Ross himself estimated the height as 12,400 feet. The first ascent was made by members of Shackleton's expedition in 1908, and Mawson at that time made the altitude 13,370 feet. Priestley, on Scott's 1911-13 expedition, gave the figure as 13,350 feet. Other estimates have been as high as 14,997 feet and 15,325 feet. But the figure usually quoted in recent years (e.g., in the British "Antarctic Pilot" and the American "Geographic Names of Antarctica") has been 13,200 feet.

In the summer of 1960-61 engineers of the U.S. Geological Survey made observations and measurements with theodolite and tellurometer and made the height 12,280 feet. More extensive observations last summer have brought a new figure, which it is claimed is "of greater accuracy". As part of a tellurometer traverse, distances were measured from Brown Island to Salmon and from Salmon to Hogback. With this extended base line precisely measured, the highest point of the mountain was estimated to be 12,450 feet: which is practically Ross's estimate of 150 years ago!

U.S. OPERATION DEEPFREEZE '62 CONCLUDED

United States Operation Deep Freeze 62 came to a successful conclusion when three aircraft of VX-6 Squadron left McMurdo on February 26.

The season's biggest project, the construction and operating of the first nuclear power plant in Antarctica, had been achieved and the dedication of the new Byrd Station had completed two years' labour.

The reactor system, the installation of which was reported in the previous two issues of "Antarctic", achieved "criticality" (a controlled self-sustained chain reaction) on Sunday, March 4, coinciding with the fiftieth anniversary of the death of Captain Scott and his party in 1912, to generate 300 kilowatts of electricity for the McMurdo Station. This output was expected to increase to 1500 kilowatts within a few weeks.

This installation, known as PM-3A, needing refuelling (with enriched uranium) only once every two years, ushers in a new era in Antarctic civilisation as well as greatly reducing the quantity of oil and petrol formerly comprising some 70 per cent. of the total freight carried to the Antarctic each season.

A few weeks earlier, the automatic unmanned (as against the twelve-man party needed by the reactor) weather station, south of McMurdo Sound, had also begun operations, transmitting every six hours to the McMurdo Sound Naval Air Facility.

AIR OPERATIONS

The twenty aircraft of VX-6 carried out 1,646 separate flights during the season just ended, logged 5,450 air hours and carried some 4,025 tons of cargo to American scientific stations in Antarctica.

The installation of the new Byrd and Ski-Hi stations were their big-

gest tasks. They also carried 5277 passengers on other projects, photographed enough material to allow for photo mapping coverage of 106,040 square miles of previously unexplored Antarctic territory, helped in the Topo North and Topo South projects ("Antarctic", December 1961) and took part in the mercy flight which saved the life of Australian Alan Newman.

SCIENTISTS TO WINTER OVER

The departure of the last aircraft and ships from Antarctica marked the end of contact with the world for 47 American scientists who will spend the next six months in increasing and waning darkness, carrying out various research investigations. Ten will be based at McMurdo, ten at Byrd, eleven at the Pole, four at each of Hallett, Wilkes and Ellsworth, one at Mirny and three at a small auroral sub-station about 45 miles away from Byrd.

NINE TONS OF RESEARCH MATERIAL

Scientific data and collected specimens which left Antarctica with U.S.S. "Arneb" on her final trip this season brought the total for this year to nine tons.

This material, collected by more than 30 U.S. universities, research institutions and government agencies participating in U.S.A.R.P. during the summer and preceding winter, includes written records, coal samples, fossils, a 70-pound meteorite, record-size fish, desiccated seals, penguin heads, ice cores, water from the

warm lakes, marine specimens from beneath an ice shelf, films and magnetic tape; four thousand pounds of "Arneb's" cargo of research material was carried in a frozen state.

SEVENTY-POUND METEORITE

A meteorite, weighing 70 lb., was amongst the scientific material carried by U.S.S. "Arneb". This meteorite, probably the largest ever found in Antarctica and probably again a unique example of the stony-iron variety was found, split in two pieces, by the geological survey party studying in the eastern Horlick Mountains. Other finds made by the five-man party indicate: (1) That chemical weathering does occur in polar regions, contrary to earlier belief; (2) That normal weathering is proceeding at a much faster rate than hitherto supposed; (3) That the ice cap had once been at least 1,500 feet higher than its present 6,000-foot level.

BIRD BANDING

More than 7,000 Adelie penguins and 718 South Polar skuas were banded by American scientists working for U.S.A.R.P. this summer, bringing the total number of birds banded during the three-year U.S. Antarctic Research Program bird-banding programme to about 25,000.

Flipper bands of varying colours depending on the banding area were placed on the penguins, and leg bands on the flying birds, to facilitate study of the movements, migrations, longevity, life histories, ecology and behaviour of Antarctic and sub-Antarctic sea birds.

Already penguins and skuas banded in other seasons have been observed, most notable of which was a skua which had moved 1,400 miles from its banding station at Wilkes at least three years ago.

United States and other scientists have banded in all at least 40,000 birds in the past years, including Emperor, Adelie and Chinstrap penguins; south polar and brown skuas; giant, silver-grey, snow and pintado petrels; wandering, black-browed and grey-headed albatrosses.

PLANS FOR NEXT SEASON

Deep Freeze 1963 plans are already under way. With nearly four years' experience completed, Rear-Admiral D. M. Tyree is to relinquish command of the operation to Rear-Admiral J. M. Reedy, whom he will personally indoctrinate in Antarctica in September of this year.

Next year's season will include some 3,000 men, 11 ships and more than 30 aircraft, units of the U.S. Coast Guard, military sea transportation service ships and specialist personnel assigned by the Army and Marine Corps. Major projects will include the making of first cuts for the nuclear power plant site at Byrd and Amundsen-Scott South Pole Stations and possibly the building of a new runway at McMurdo Sound.

Also relinquishing his position, in July, will be Captain E. A. McDonald, deputy commander of the U.S. Navy Antarctic Support Force, who is due to retire from the service on July 1. In June he goes to London to receive a medal from the Royal Geographic Society for "outstanding service to Antarctic exploration".

NEW STATION PLANNED

A permanent year-round scientific station is to be established in Ellsworth Land next season. It is expected to become operational in January, 1963.

The main work which will be carried out by the 12 scientists at the Eights Station (as it is likely to be known) will be focussed on upper atmosphere studies and conjugate point research.

WEATHER ROCKETS

After two partial failures, the third meteorological rocket fired by the Texas Western University team at McMurdo rose an estimated 200,000 feet. It was tracked from launch to apogee and separation, about 112 seconds, then flew 26 minutes until the signals faded.

Removing "Roosevelt Island" From The Map

by W. R. LOGIE

[When the other 'wintering over' men returned to New Zealand from Scott Base early this year, Ray Logie stayed behind in the Antarctic. He was the New Zealander in a remarkably international team which removed an island from the map, but learnt a great deal about the ice-island which replaced it.— Ed.]

With the object of carrying out the first of a series of studies of the Roosevelt Island ice dome a party under a National Science Foundation grant to the University of Wisconsin was flown out to the Roosevelt Island Ice Cap.

The members of the party were: Leader, Mario B. Giovinetto (Argentina); seismologist, Manfred Hockstein (West Germany); assistant seismologist, Jerry F. Clark, geophysicist, William L. Unger, surveyor, William Heilman, surveyor, James Clapp, general assitant, Hugh Kiefer (University of Wisconsin); traverse engineer, Raymond Logie (New Zealand).

A visitor to the party was Dr. Carl S. Benson (University of Alaska), and during the two weeks he was with us his knowledge of the glaciological pit studies proved invaluable to the party.

On October 27 two aircraft from the United States Navy VX-6 squadron landed the first of our party and their equipment on the Roosevelt Island Ice Cap. Mario and Manfred were on board the R4D which was first to land. I travelled on the Hercules C-130 which landed a few hours later on an area marked out by the crew of the first aircraft to land. In a matter of 15 minutes our two Trackmasters (snow vehicles), sledges and drums of petrol were unloaded from the C-130 which along with the R4D then took off for McMurdo.

With a temperature of -30° F. and

a 10-knot wind we were only too pleased to crawl into our sleeping bags to be awakened some six hours later by the C-130 returning with another load of equipment. During the first week Mario and I unpacked equipment and erected a cook-shack made of packing cases and the odd sheet of plywood, while Manfred took the opportunity of testing and adjusting his seismic and magnetic instruments.

Another aircraft arrived bringing Bill, Jim and Jerry and more equipment, and after a few days of preparation Mario, Jim and myself set out by Trackmaster on a 35-mile traverse to the South. Traverses to other parts of the island followed in quick succession.

CASUALTY

On a return from one of these traverses we found Manfred in a rather poor state of health, so decided to radio McMurdo for medical advice but while trying to contact them an R4D unexpectedly touched down with fuel, rations and mail. Manfred was flown back to McMurdo and then to Christchurch where he spent several weeks in hospital recovering from hepatitis. Some weeks later he was replaced by William Unger of the University of Wisconsin, Manfred returning to Roosevelt in mid-January.

REINFORCEMENTS

Our return from our next traverse found two new members in camp, Dr. Carl Benson and our general assistant, Hugh Kiefer. During the

second week of December we were paid a visit by an R4D and an Otter aircraft. The R4D unloaded aviation gas and other equipment and then returned to McMurdo taking Jim Clapp, who for personal reasons had to return to the States. The Otter stayed with us a few days during which time photo reconnaissance flights over the Bay of Whales and Saltzberger Bay area were made. A crew member of the Otter was P.O. Peter Tremaine, a fellow Kiwi who was flying with VX-6 Squadron.

In mid-January while we were out on traverse a C-130 arrived bringing another Trackmaster, making a total of three. In order to carry out repairs to this last vehicle I returned to Base Camp, a distance of 25 miles, by skiing behind Mario's motor toboggan.



IS IT AN ISLAND?

In exploring the island we accomplished 615 miles of altimetry traverse and 345 miles of glaciological traverse. Thirty seismic reflection soundings and four seismic refraction profiles indicate the ice dome and the rock beneath to be as follows: the dome at its highest point has a thickness of 2,500 feet, the amount above sea level being 1,800 feet. This would seem to indicate that 700 feet of rock or bank are below sea level. The shape of the

island would appear to be slightly different from that shown on the map, though length and breadth seem to be equal.

Ice hardness and stratigraphy were studied in five 13-foot pits with corings being made to depths of 56 feet. The annual accumulation at Roosevelt Island was found to be between nine and fourteen inches of water, or the equivalent of about three feet of snow.

THE MOVING ICE

In order that a record of ice movement could be obtained we set up two grid patterns of bamboo poles, the first being across a two-by-nine-mile area on the high ridge of the ice dome. The second was two and a half by twenty-five miles, this one extending from the ridge down to the point at which the dome and shelf ice met. By the use of altimeter and level we were enabled to determine the elevation of the stakes. The distances between stakes we measured by an electronic distance measuring device (the tellurometer). At some future date our distances by elevations will be remeasured when the variation will give a good idea of the rate and direction of the movement of the ice.

With time running out on February 14, we prepared to evacuate camp, first dismantling and storing the Jamesway building which had been erected some five weeks earlier. To keep the drift out, the doors and windows of the Trackmasters were sealed up, the rest of the gear being cached and its position marked by bamboo poles. Everything being satisfactorily completed we were flown back to McMurdo by C-130, our season's work finished.

"ELTANIN"

The scientific equipment aboard the U.S. Antarctic research ship "Eltanin" has been thoroughly tested on two "shakedown" exercises (1) February 27-March 9, across the Gulf Stream towards Bermuda; (2) March 15-April 16, between New York and the Labrador Basin.

THE VALLEY GLACIERS WHICH FEED THE ROSS ICE SHELF

by C. W. M. Swithinbank

[We are pleased to be able to publish this first-hand account of glaciological work carried out last summer by our American friends in an area where much of the exploratory work was done by British and New Zealand expeditions.—Ed.]

A three-man expedition organised by the Glacial Geology and Polar Research Laboratory, University of Michigan, flew from New Zealand to NAF McMurdo on October 14, 1961, in a U.S. Air Force C-124 "Globemaster". Members were Charles W. M. Swithinbank, glaciologist; Thomas E. Taylor, surveyor, and Arthur S. Rundle, assistant glaciologist. The object of the expedition was to continue measurements begun in 1960-61 of the rate of movement of the principal valley glaciers flowing into the west side of the Ross Ice Shelf. For part of the season the party worked together with a geophysical team from the University of Minnesota led by Edward Thiel. Thiel was killed in the crash of a U.S. Navy P2V Neptune at Wilkes Station on November 9.

Byrd Glacier* was visited on October 23, using two HUS helicopters. A Worden gravity meter was read at four places on a line across the glacier. The party was flown to Nimrod Glacier† from NAF McMurdo in two R4D aircraft on October 30. Ten gravity readings were made at ice movement stakes planted the year before, and the rate of movement was determined at 7 points spaced across the glacier between Cape Lyttelton and Cape Wilson.

Using Eliason and Polaris motor

* Debouching from Barne Inlet.

† Debouching from Shackleton Inlet.

toboggans, the party set out for NAAF Beardmore on November 5. The 174-mile journey along the foot of the mountains was completed on November 13. En route, five ice movement markers established the previous year were found and resected. Four days later the party traversed the 27 miles to the mouth of the Beardmore Glacier with a single motor toboggan. Twelve ice movement stakes were re-surveyed and 14 gravity stations were established on a line between Mount Hope and Airdrop Peak. The party returned to NAAF Beardmore on November 22, where it remained until December 7 owing to lack of available air support.

TOWARDS THE EAST

On December 7 Swithinbank, Taylor and Rundle were flown east along the Queen Maud Range in an R4D aircraft piloted by Lt. James Weeks, U.S.N. An intended landing at Robert Scott Glacier was prevented by bad weather. After a reconnaissance of the glacier the party was landed together with two motor toboggans, food for six weeks, fuel for 320 miles, camping, glaciological and survey equipment, on the ice shelf 30 miles off the mouth of Amundsen Glacier. The 82 miles to Mount Hamilton on Robert Scott Glacier were covered in four days. This journey was particularly trying for the motor toboggans. Over much of the distance the surface consisted of rough, hard sastrugi up to three feet high. Despite occasional capsizes, the vehicles survived the ordeal without visible damage.

Both machines were driven on this journey and throughout the season by remote control. Ropes are led from the toboggan's steering skis to



Sledge train on the Beardmore Glacier.

a helmsman following 60 feet behind. All men are on skis, so that the whole sledge train could fall into a crevasse without risking life or limb of its driver or passengers. This method of driving is safer and more comfortable in the crevassed terrain characteristic of the mouths of the great valley glaciers. Moreover it lessens the wear and tear on the vehicles compared with riding on them.

At Durham Point the party found a cairn erected on November 29, 1934, by the Queen Maud Geological Party of the second Byrd Antarctic Expedition. Inside was a note signed by the three men, and beside the cairn was a stadia rod, plane table tripod, two ice axes and two pairs of crampons.

MAN HAULING

Resorting to man-hauling at Mt. Hamilton in an attempt to cross the rough bare ice of the glacier, the Michigan party was forced by severe crevassing to return after only four miles to the safer ice at the foot of

the mountain. Without flagged stakes planted across most of the width of the glacier, it was still possible to make ice movement measurements by using moraine boulders and conspicuous crevasses as survey markers. Points were fixed by conventional triangulation, using a theodolite at each end of a baseline established on the mountain. Considering that the camp at the foot of Mt. Hamilton was nearly 3,000 feet above sea level and within 300 miles of the South Pole, the air temperatures encountered were remarkably warm for the latitude. Day temperatures were consistently around $+20^{\circ}$ F. Ice temperatures, which below the level of seasonal fluctuations are known to lie close to the mean annual air temperature, suggested that this kind of weather was probably quite normal for the area. The ice temperature at a depth of 33 feet was -1° F., whereas an average figure for this latitude would be around -20° F.

RETURN JOURNEY

Returning once more to the ice shelf on December 24, the party made a long detour to avoid extensive bare blue ice at the mouth of Robert Scott Glacier, before heading into the coast at O'Brien Peak. The 90 miles to the foot of Amundsen Glacier were covered in three and a half days, in spite of a further detour made necessary by a dangerously crevassed area at the edge of the ice shelf. An attempt was made the following day to cross to the left bank of the glacier to plant survey markers and to make gravity measurements. But after seven miles the party was brought to a halt by severe and extensive crevassing, and reluctantly beat a retreat. Movement measurements were made, as they were at Robert Scott Glacier, by using boulders and crevasses as targets for angle measurements.

Owing to a misunderstanding about radio messages, the party's routine position reports were not received at McMurdo for a period of ten days at the end of December. Finally an R4D search aircraft piloted by Lt. Ronald Carlson, U.S.N., located and landed briefly beside the party on January 4 to see that all was well. A continuous period of foggy weather at this time confined the men to their tents for twelve consecutive days, an unpleasant kind of record for them all.

OLD CAIRNS FOUND

Leaving Amundsen Glacier on January 15, one motor toboggan covered 95 miles in two days. Much of this distance was again accounted for by a wide detour on to the ice shelf to avoid the disturbed area at the mouth of the glacier. A brief stop was made at Mount Betty, where Amundsen's cairn, erected almost exactly 50 years before, was found still intact and still containing a full 5-gallon can of kerosine. Fifty yards away was a cairn erected on December 28, 1929, by the Geological Party

of the first Byrd Antarctic Expedition. Inside was a note by Laurence M. Gould, Leader of the party, together with a large assortment of clothing, some first aid supplies, radio parts, dog harnesses, and Gould's geological hammer. A broken Nansen sledge and a camera tripod were lying against the outside of the cairn.

Nine days were spent at Liv Glacier. A complete traverse was made, in which nine gravity stations and seven ice movement markers were set up. Returning to the ice shelf, the party was flown out in two R4D loads to NAAF Beardmore and thence to NAF McMurdo on February 1.

In addition to the ice movement work, positions were determined by sun observation at each glacier visited. Three baselines were measured and all visible peaks intersected. Taylor completed a reconnaissance triangulation network covering about 150 miles of the mountain range. Ice temperatures were observed in a drill hole at each glacier, and routine weather observations were made throughout the period.

LAST STAGE

The party was carried in two HUS helicopters to Mulock Glacier on February 10. Eight ice movement markers established the previous year were re-surveyed and eight gravity observations were made in a line across the glacier. The helicopters reappeared on February 13 and returned the party to McMurdo.

In all, successful movement measurements have now been made on seven of the eight principal valley glaciers in 650 miles of mountain range. The gravity measurements will give a first approximation of the depth of ice on each glacier. Actual movement figures have not yet been computed; but it appears that Byrd Glacier is the fastest moving and Liv is the slowest of the glaciers visited. In the course of the season, one motor toboggan covered a total of

NEW ZEALANDER AT ISOLATED POST

On March 17 three men settled down for a long winter's night of auroral observations in a unique sub-snow building about 42 miles north-east of Byrd Station.

For the next five months of uninterrupted darkness, they will be entirely self-sufficient, communicating with Byrd and with the outside world only by radio. By taking photographs of auroral displays simultaneously with other observers, they hope to determine the height above the earth of the aurora australis.

The research aims also at comparing the southern lights with the northern lights, and fixing more precisely the zone of maximum auroral in the Southern Hemisphere. In addition, clues may be found to increase man's understanding of how and why these strange light displays occur and how they relate to other upper atmosphere phenomena.

Manning the auroral sub-station are A. E. Hedin, J. P. Turtle, and New Zealander G. N. ("Johnny") Johnstone. The sub-neve, or sub-snow, building which together with a generator building constitutes the sub-station is approximately 16 by 32 feet in area and is made up of a number of modular components joined together and placed in a trench in the snow. Structural supports af-

723 miles hauling an average load of 1,500 lb., while two others each covered around 575 miles. Fuel consumption on the 300-mile journey along the Queen Maud Range averaged 12 miles per gallon for each vehicle.

After further ice movement studies in the McMurdo Sound area, the members of the party returned separately to New Zealand between February 18 and March 11.

fixed to the roof rest on a series of weight-spreading pads on the snow surface. Most of the weight of the building is borne by timber resting on oil drums beneath the building. Through a system of lifting jacks, the entire building can be raised to greater heights as the snow accumulation gradually covers the station.

The building has both a photo dome and a visual observation dome that extend above the snow surface. Beneath the building is a large storage area. Two rubber tanks in a seven-foot pit provide the three occupants with a one month supply of diesel fuel. Additional fuel is stored outside the station area in barrels.

EVACUATED

The satellite station was evacuated on March 28 because of a generator failure, and the impossibility of installing a stand-by plant. The personnel are engaged on special activities at Byrd Station.

NO NORWEGIAN EXPEDITION

We are informed by Norsk Polar-institut that the Norwegian Government has decided that at the present time it cannot mount the proposed expedition referred to in our last issue. The decision has been taken for economic reasons and because of the necessity for Norway to increase her activities in the Arctic.

THE WORLD'S COLDEST

Soviet scientists say that the coldest place in the world lies between 375 and 440 miles south-west of the Soviet base, Vostok (78° 27' S., 106° 52' E.). Temperatures at this spot often reach -130° F.

ADELIE LAND

[We regret that information forwarded us by Expeditions Polaires Francaises for inclusion in this issue has not arrived as we go to press.

The following note is from an article written for the Hobart "Mercury" by Mr. C. H. Hand, Consul for France, who visited the French base in the summer.]

During the summer campaign scientists from France joined the expedition to supervise the installation of equipment and collect the data that has been recorded during the previous winter. They advised the scientists and observers who will remain during the next winter and set everything in train for the year's work.

Part of the summer campaign is the survey of the neighbouring waters and coast whenever ice and weather conditions permit.

This year the "Magga Dan" made a reconnaissance survey of the coast west of Dumont D'Urville almost to the boundary between the French and Australian sectors.

Unusually favourable weather enabled the position of islands to be determined by astro fixes and several new islands were discovered. Overlapping radar-photos of the coastline were made at fixed intervals between known points, and these when pieced together gave an accurate plot of the Antarctic coastline. A continuous line of soundings showed the contour of the bottom of the sea.

This survey showed that the coastline as charted was considerably in error.

The summer season is short and storms in February brought it to an abrupt conclusion on February 14.

Gear was loaded, the helicopter flown on to its platform, secured and cased in, and the first opportunity was taken to leave. "Magga Dan" forced her way through a few miles of loose pack-ice and then set a

JAPAN REPORTS

Although Showa Base has been, temporarily it is hoped, closed down, the Antarctic office of the Japanese Ministry of Education is steadily working on the data accumulated during the five years during which, with one winter break, the base was occupied. The latest issue, no. 14, of "Antarctic Record" containing J.A.R.E. reports, was published on January 31 this year. A splendidly illustrated journal of 108 pages, it contains articles on airglow, cosmic rays, geology, petrology, seismology, meteorology, oceanography and biology (six papers). Some of the articles are in English, and the others have very full English abstracts.

The continuing oceanographic survey outlined in our last issue is planned to last five years. This circum-Antarctic project was begun in 1956, when a research programme in the area 0°-90° E. was partially carried out. 1961-62 is being devoted to the area 50°-20° E. Further plans are as follows:

1963-64: the area 90° W.-180°.

1965-66: the area 90° E.-180°.

ERRATUM

Vol. 3 no. 1, March 1962, p. 6, l. 34, for "bright" read "high".

BRING YOUR FAMILY

Dr. Paul Siple is reported as saying that families will be living permanently at Antarctic stations within ten years. The present "artificial situation" of pioneering by men only could not remain long. "Husband and wife teams will soon be working as a family unit in Antarctica," he said. "However, full-scale colonisation of Antarctica is a long way off. People there will be dependent on the outside world for food supplies."

course for Hobart, about 1,400 miles to the north. The vessel reached Hobart on February 20, carrying 39 men returning after their year in the Antarctic.

NEW SOUTH AFRICAN STATION

The most important project during the S.A.N.A.E. III expedition was the construction of an entirely new station 12 miles from the old base. This task has been successfully accomplished.

South Africa began continental Antarctic research in January, 1960. The first S.A.N.A.E. expedition took over the existing "Norway" station. This had been constructed by the first Norwegian I.G.Y. expedition in Dronning Maud Land in the 1956-57 summer in 70° 30' S., 2° 32' W., 55 metres above sea-level, and was occupied by the Norwegians until the South Africans arrived.

SIGNS OF AGE

The need for a new station is evident from the following reference (in S.A. Weather Bureau Newsletter, Nov., 1961) to conditions at the old base:

"The beams in the building are steadily subsiding. Supports have been placed wherever that was possible. Most of the walls have been straightened by sawing them into two halves which can slide over each other. The warm weather causes large quantities of ice to melt. Pillars of ice are being formed in the corridor and behind the bathroom. Doors are kept closed and all heating is turned off. The door and window frames are subsiding unequally and are planed or chipped off till they are straight again. A curtain has been hung at the entrance to the dining room in order to prevent the escape of a large volume of warm air when a door is opened. Quite a number of boards in the corridor are broken."

RAPID WORK

The erection of the new station buildings, which are about 12 miles NNE of the existing Norway Station, proceeded much quicker than had been anticipated. Originally it was thought that the erection would not be finished before the end of February or beginning of March. To complete the buildings after the

ship's departure two carpenters were initially included as members of the wintering expedition.

The relief ship "R.S.A." arrived in Antarctica on January 25. All stores had to be transported 12 miles inland by three muskeg tractors with sledges. As stores were brought up, erection of the buildings was commenced and on February 11 the men moved into the new station buildings and reported that more than 90 per cent. of the work had been completed. The two carpenters therefore returned to South Africa.

This accomplishment was achieved by the very fine co-operation of the 13 Public Works Department artisans, the 15 new expedition members, 11 old expedition members as well as the ship's crew. It snowed on several days. A very important factor in the smooth operation was probably the fact that before departure from South Africa the P.W.D. artisans and expedition members gathered in Cape Town where they erected most of the pre-fabricated huts and in this way gained valuable experience.

THE NEW STATION

The eleven huts comprising the new station are as follows: Science hut (800 sq. ft.); living quarters (480 sq. ft.); power station (480 sq. ft.); toilet (72 sq. ft.); sleeping hut (1440 sq. ft.; this includes a separate cubicle for each person, the hospital and several scientific rooms); balloon hut (75 sq. ft.); garage (1080 sq. ft.); optical theodolite hut (72 sq. ft.); magnetic hut (72 sq. ft.); animal laboratory (90 sq. ft.) and a magnetic variometer hut (72 sq. ft.). The huts are inter-connected by corridors which also serve as storing-space. Ample provision has been made for forced ventilation, drying-

room, hotwater, bathroom and other amenities.

The buildings are constructed of specially prepared panels of 8ft. x 4ft. x 4ft. each weighing 75lb. Roof and flooring consist of laminated beams of 20ft. x 10ft. x 4ft. each weighing about 250lb. The panels are joined with rubber strips for insulation and fixed with iron clamps.

The buildings rest on wooden platforms and beams in order to reduce future uplift pressures. The windows are made of two layers of perspex, with nitrogen between them for a good insulation. These are the first buildings prefabricated at home and erected on S.A.N.A.E.

S.A.N.A.E. NEWS

The expedition celebrated their second white Christmas in separate groups. Five of the men were holding the fort at the base, while the others were busy with field work. The Muskeg left 10 days before Christmas for the mountains, where van As and Swanevelder were doing survey work and other observations. The four men with the Muskeg and the two with the dog-sledge met two days later. The dog-sledgers then departed for Dassie Depot. On their way they visited some nunataks and mountains for the purpose of completing the survey and observing duties allotted.

The Muskeg team travelled further south to do more geological and geomagnetic observations. They reached a point approximately 95 miles south of the base. Heavy snow storms were experienced and the men had to stay inside their tents for a few days. On Christmas Eve the two groups met at Dassie Depot. They were fortunate because a second storm soon afterwards forced them to stay for another four days in their tents.

At the base, Piet Voges was responsible for an excellent Christmas dinner. Unfortunately there were only five to enjoy it.

FIELD PARTY RETURNS

On December 31 the six travellers returned to the base after their trip of approximately 500 km. in 18 days. During that time they had 8 days of gale and bad visibility.

During the trip magnetic work was done between the Steinkumpen and Sukkertop ranges. But did quite a lot of geological work near the Sukkertoppen. At the Dassie Depot the two groups met and from there returned together. Geomagnetic and gravimetric tests were made on their way back.

Muskeg depot, established in the Steinkumpen range during the first muskeg trip, was shifted to a rocky plateau on the route to the Sukkertoppen range. When passing from the icecliff to the mountains and also in some other spots crevasses were found, some of which were very large, but after thorough exploration it was always possible to find a way.

At Dassie Depot the snow accumulation was 140 cm. since before the winter.

Due to the extensive field-work programme during December, the entire meteorological programme was carried out by two men during half of the month. In December the maximum and minimum temperatures were $+0.4^{\circ}\text{C}$. and -17.0°C . respectively with a monthly mean value of -6.3°C . The mean windspeed was 16 knots and the maximum gust 69 knots. Snow fell on 18 days.

In January again the mean temperature was -7.3°C . and the maximum and minimum temperatures $+0.4^{\circ}\text{C}$. and -25.3°C . respectively. January was a relatively calm month with mean windspeed 7.6 knots, highest gust 40 knots and no gale force winds. The station recorded a mean of 11.9 hours sunshine daily.

CHANGE OVER

On February 11, responsibility for the scientific work passed on to the 1962 expedition. The last recording instruments at the old base were stopped just before the three sledges

with personnel and official baggage left. Those who could not get into the muskeg made themselves comfortable on the sledges. Jonas, the veteran husky, who is returning to South Africa, due to old age, found a place close to Barry Butt on the hind sledge. The diesel engines were quiet and the station inside quite dark as the national flag, last symbol of the 1961 expedition's stay, was lowered. Soon afterwards the flag

was hoisted at the new station.

By 2 o'clock on Monday morning all departing members were on board the 'R.S.A.'" Later in the day a farewell party was given in the ship's smokeroom. Shortly afterwards the anchor guys fell away and the small group of 13 men were alone on the ice-shelf. After the traditional hoots the "R.S.A." moved away. Three green Very lights from the remaining group signalled the final farewell.

Eventful First Antarctic Voyage

The South African icebreaker, the "R.S.A." ("Republic of South Africa"), left Cape Town on Saturday January 6, with a crew of 35, viz., 15 members of the expedition, 13 members of the D.P.W., 6 fully grown huskies and 5 husky-puppies 2 months old.

From January 16 many icebergs were sighted; in the evening the position of the ship was 53° S., 09° W., and a speed of 8 knots was maintained. There was a heavy fog.

That night at 2200 hours the ship met ice and at 0400 hours on the 17th entered the pack-ice. The midday position was 61° 27' S., 9° 30' W.

On the 19th the midday position was 67° 12' S., 7° 35' W. The ship was in open water and proceeding almost at top speed.

On the 21st the ship was in heavy pack-ice. On the 22nd the ice-barrier was in sight.

On the 23rd the midday position was 70° S., 5° 55' W. There were approximately 4 miles of solid ice between the ship and the ice-barrier. The husky lead-dog Singarnak, who took ill on the 22nd, died on the 24th. The midday position was 70° 09' S., 5° 40' W. and the direct distance to the base 66 miles.

At 0200 hours on the 25th the ship broke through the ice and at 0800

hours she arrived at the unloading berth at Polarsirkelbukta. At 3 p.m. the first trailer departed to trace the route to the new base and at 6 p.m. two trailers went with the "keboes" and the building materials. Thereafter trailers and sleds containing supplies left regularly from the ship to the new base and good progress was made with unloading.

"R.S.A." left for home on February 12. A Cape Town message on March 8 said that the ship was caught with rudder trouble in pack-ice north of the South African station on Princess Martha coast on the 6th, and was struggling to free herself.

The 1572-ton ship had taken 24 days to cover the first 95 miles of the trip to Cape Town. There was ample food and fuel.

Two American ice-breakers then in New Zealand at once prepared to go to the "R.S.A.'s" assistance, but the ship was trapped in 68° 30' S., 3° 50' W., and it would take "Glacier" three weeks to reach that position.

On March 21 it was reported that the pack-ice had shrunk the pool in which the ship lay from 10 square miles to a few hundred square yards. The depth of ice was already 10 feet and building fast.

The American ice-breakers racing to the rescue through bad weather from New Zealand were still at least

nine days away — far enough for ice to build to an impregnable depth.

On March 23 the British warship, H.M.S. "Protector," en route to Cape Town from the South Atlantic island of Tristan da Cunha, reported a "vast undersea volcanic eruption".

A message from "Glacier" to her Christchurch headquarters quoted Captain K. T. McNish, master of the "R.S.A.", as saying the ice was much broken up, possibly due to disturbance off the Sandwich Group late the previous week.

The pool was much bigger, Captain McNish, said, but at that stage he was still unable to make progress.

Later, Captain McNish reported that his vessel's rudder, previously thought to have been broken, had no visible damage. He was proceeding at three knots.

The U.S. Navy headquarters at Harewood then received a message from the "Glacier" reporting that the South African ship was in clear water and steaming ahead at 11 knots.

Captain McNish said the supply ship was in open water and proceeding at full speed. She had broken out of the ice at 3 p.m. on the 22nd.

"R.S.A." arrived at Cape Town on April 3.

REFRIGERATORS IN REVERSE

The Australian stations are using refrigerators — to keep things warm. Some medicines — and beer — for example, can become useless if exposed to ambient temperatures down to -30° F.

Jim Lowery, severely injured in the Sno-cat crevasse disaster in 1959, hopes to complete his N.Sc. degree in geology this year.

WILL THE ICE TELL?

Scientists of the 4th Soviet Antarctic Expedition, after analysing heat exchange processes, have come to the (theoretical) conclusion that the lower layers of ice, squeezed against the rock bed by the weight of the ice cap, must be continually melting. Thus there is presumably a sea of fresh water under the Antarctic ice-cap covering an area roughly the size of Europe. It must be rich in oxygen, provided by the gradually sinking upper layer of ice and snow. It is possible that this sub-glacial sea contains its own unique life.

One of the ways of testing this theory would be to drill a hole down to the rock bed, but the movement of the ice cap precludes the use of ordinary equipment. Powerful thermal drilling appliances will have to be used.

Examination of samples of ice taken from different depths would provide information on climatic conditions in Antarctica 1,000 years ago, 10,000 years ago, etc. The knowledge of past climatic conditions would tell us for certain whether to expect in the future an increase or a decrease in the temperature of Antarctica.

In years where snow-fall is low, certain countries, particularly in Central Asia, suffer from a lack of water due to the insufficient replenishment of mountain rivers and streams. If we knew in advance which years were to have low precipitations, it might be possible to replenish rivers by artificial thawing of glaciers. However, to learn how to control the regimen of rivers we must have a thorough understanding of the heat exchange processes taking place in glaciers.

Australian Activities At Three Antarctic Bases

At all three Australian-manned bases on the Antarctic mainland, Mawson, Davis and Wilkes, the relief parties have settled in quickly, have become completely at home with the running of the stations and have made early preparation for field journeys.

MAWSON

In early February Mawson was visited by the Russian Antarctic ship "Ob" whose complement, including several of the fairer sex, were warmly welcomed and entertained.

Early in March a party of ten made a trip to Twintops, 50 miles south from Mawson, with Lucas as leader, using two tractors. Landon-Smith, glaciologist, planted bamboo stakes, Filson collected lichens from the ranges, and Branson was geologist. The success of this trip proved that all equipment was in first-class order, so that, after four days, Lucas led a second party to lay depots for the main spring traverse to Amery Ice Shelf. They achieved their objective despite a broken-down weasel and temperatures of -40° , and returned to base on April 9.

Landon-Smith (glaciologist), Filson and Woodberry (physicist) left Mawson on April 10 with a sledge loaded with 600 lb. of supplies to carry out glaciological studies in the Framnes Mountains. They hauled the sledge by hand across the plateau ice and glaciers and returned to Mawson on April 25. Work completed included establishing stakes between Mount Henderson and the Casey Range to measure snow accumulation and glacier flow rates. The Casey Range was climbed and lichens were collected from the rocks.

During April, alternating pairs of men opened the remote weather station in a caravan, south of Henderson.

DAVIS

A source of fresh water for station needs was the main problem confronting the new party on its arrival at Davis. A rapidly diminishing snow drift accessible by tractor served for a time, but before the first snow arrived in late February, the water supply was augmented by lassoing occasional ice floes from the dinghy.

The remote weather station, Platcha, could only be reached by hiking the 15 or 20 miles over rough going, until sufficient snow made the journey possible by dog-team in April.

SHIP-BOUND

The "Nella Dan" stayed two days on her return journey from Mawson but, unfortunately, the weather was unkind and there was the position of the men being on the ship — and the work on shore! The engines were transferred to the new power house and several other jobs performed.

March brought the first taste of Antarctic weather, with heavy snow falls and two blizzards, to the first timers — there are only four of these as Teyssier is making his fourth trip and Boda his third trip, while Molle, Ward and Harrop are on their second trip.

By April the hours of daylight were rapidly decreasing and auroras were regularly witnessed lighting up the sky. Snow drift had now built up to the sleeping and living quarters' roofs, so snow for water presented no problems.

WILKES

The new party at Wilkes under Bob Thompson immediately set about a large building programme, but nevertheless preparations were also in hand for a field trip of some 350 miles. By mid-February all was ready for this journey but the departure was delayed until the arrival of the "Nella Dan" on February 28. The "Nella Dan" was returning to Melbourne with the 1961 wintering parties from Mawson and Davis.

IN THE FIELD

On March 1 the field party of four men led by Thompson set out, to return again on March 23 after a successful 335-mile traverse south and east of Wilkes. Poor weather, bad visibility and soft snow conditions proved most difficult on part of the trip, but the warmth and comfort of the caravan were appreciated during the days when they were blizzard bound.

In the meantime four men had camped for one week on the plateau near the airstrip for glaciological studies.

April gave all a taste of the colder things to come, with record low temperatures for this month of 58 degrees below freezing. The sea was by now frozen over and the sun visible low on the horizon for only a few hours daily, but producing beautiful colours in the sky and keeping all the photographers busy.

The lowest temperature for the month, 90 degrees below freezing, was recorded by the party which travelled 50 miles inland to remote station S2.

After an absence of four days this party returned to the comfort and warmth of the base on April 14, having accomplished their mission, entailing glaciology pit measurements and maintenance work, at this lonely inland station.

ANZAC DAY COMMEMORATION

Anzac Day produced what may well be remembered by all as the occasion of the year and possibly the most colourful ceremony yet held in Antarctica. A perfect day, with just sufficient breeze to flutter the flags, was a welcome help to the planned ceremony in which the three men in uniform — Evans—Army, Calman—Navy, Collins—Air Force — and all others in ANARE uniforms gave a special air to the occasion. The quietness during the prayer and silent period was a contrast to the ensuing firing of salute and the sound-*ng* of "Last Post" and Reveille.

LOST YEAR

Alan Newman, the Australian diesel mechanic who was brought from Mawson Base to Australia by Russian and American planes in December-January after an emergency operation in the Antarctic for cerebral haemorrhage, woke from a coma in February to find that a year was missing from his life. He remembered nothing from the day in January, 1961, when he sailed down the Yarra on "Thala Dan" bound for the Antarctic.

On March 22 he was recovered sufficiently to speak to reporters at St. Vincent's Hospital, Sydney. "When I woke up I couldn't remember a thing," he said.

"I thought I was still in Melbourne. I recognised my mother, but I could not recognise my wife.

"In fact I was yelling out that I wasn't married. It was pretty embarrassing."

Newman, more than 16 stone when he left, is now less than 8st. 6lb.

A significant factor in the staffing of the Australian stations is the number of "old-timers" who return time after time. Australia would appear to have a hard core of bachelor enthusiasts who must aid considerably the continuity of programme.

FIRST ASHORE IN OATES LAND

Phillip Law, Director of the Australian Antarctic Division, returned to Melbourne aboard "Thala Dan" on March 8 and gave the following details of the successful survey of the coast and hinterland of Oates Land, lying in New Zealand and Australian territories.

Oates Land, extending from 155 east to roughly 165 east long., was discovered by Captain Pennell of the ship Terra Nova in 1912 and named after Captain Oates who died with Scott on the return from the South Pole. It has remained one of the last unexplored coastal regions in Antarctica because its coast is protected by consistently heavy pack ice and its weather is notoriously abominable.

It is highly mountainous and the coast is rugged and inhospitable, with sheer rock bluffs or ice cliffs rising from the frozen sea. The heavy pack ice generally prevents an approach by ship until late February, then at the beginning of March the sea begins to freeze over again. Opportunities for investigating the region from the air are rare because of the prevailing bad weather, which is compounded of fog, snow storms and blizzards.

In 1959 and again in 1961 we conquered the pack ice but were beaten by the weather. This year I had arranged an itinerary which provided for a stay of two or three weeks if necessary, and I was prepared to wait patiently for the odd sunny day which I felt sure must occur occasionally.

At first our faith in such an event was severely tested. Good ice conditions this year allowed us to penetrate to the coast at Cape Hooker and to anchor off Cape North, but there we sat, stifling our frustration through nine days of fog and snow, with winds up to 60 knots, before we were able to achieve any more than minor results.

Then our luck changed and out of the next five days we had two full and two half-days of fine weather. My impatient men needed no urging and while the Beaver float plane, with R.A.A.F. pilots, made flight after flight for aerial photography and determinations of plateau heights up to 100 miles inland, the helicopters ferried scientists to selected points along the coast for observations.

Even then we did not have an untroubled run of success. On one occasion the Beaver aircraft was unable to take off because during a calm period all the sea surface had frozen; on another, when a wind prevented such freezing, the plane became badly iced up by freezing spray while attempting to take off in a choppy sea and had to abandon the flight.

On Wednesday, February 21, our two helicopters, piloted by John Stanwix and John Arthurson, set out at 9 a.m. to carry surveyors Kirkby and Burch 50 miles to take an aströfix and magnetic observations near Mt. Gorton, which we had named in 1961.

On Friday, February 23, at 2.50 p.m., the ship's engines were stopped because of an over-heated bearing in a gear box on the propeller shaft. The weather became wild and stormy, and the wind rose to 35 knots. The ship drifted helplessly for 20 miles overnight, wallowing broadside to the wind, until at 8 a.m. next morning the hard-working engineers completed their repairs. Fortunately, there were no icebergs in this area and we were far enough off shore to be clear of reefs.

Many people today imagine that the adventure has gone from Antarctic exploration; but it takes courage to fly a single-engined float plane 200 miles from a ship, far inland over ice-covered mountainous country, and when helicopters land for survey work on the crests of 4000-foot peaks there is a niggling worry in the back of one's mind that perhaps their engines might not start again in the prevailing low temperatures.

Now it is a job for cartographers and specialists to interpret the data obtained and to convert it into map form. This will take months of meticulous work, but when it is finished some 20,000 square miles of previously unknown territory will have been exposed. Still another of Antarctica's secret lands will stand revealed.

MIGHTY DRIVE

Australian Antarctic weather-man Nils Lied slammed a black-painted golf-ball across Mawson Harbour, out through the harbour mouth, over the outer approaches, on to an island: a one and a half mile drive. He had to use a dog-team to help him find and recover the ball.

Nils's golf "shoes" were "mukluks" — canvas overboots.

"The following wind was 40 knots straight down the fairway," said Nils. "My assistant watched with binoculars.

"For once I got right behind it. My mate watched it just about all the way and we checked the distance on the map."

For golfers: Nils teed up on a long countersunk wooden screw which was hammered into the ice. He used the "communal" No. 1 wood.

(The longest recorded and measured drive on a golf course is 445 yards.)

MORE VETERANS PASS

SIR JAMESON ADAMS

We regret to announce the death of Sir Jameson Boyd Adams, who as Lieut. Adams, R.N.R., was a member of the shore party of Shackleton's British Antarctic Expedition, 1907-1909. Adams, though not a trained meteorologist, carried out most of the meteorological work of the expedition, and he was one of the Southern party of four which discovered and first traversed the Beardmore Glacier, and after the greatest single advance in Antarctic history reached a new "farthest south" of 88° 23' S., only 113 statute miles from the South Pole. We are informed by Sir Raymond Priestley that "Bill" Adams died in his sleep on or about May 11.

A. D. WATSON

We regret to announce the death in January of Mr. A. D. (Andy) Watson, who was geologist in the Shackleton Ice Shelf group ("Western Base") of Mawson's expedition in 1911-14. He took part in several sledging journeys, accompanying Frank Wild on his main eastern journey during the 1912-13 summer.

END OF THE "QUEST"

The Norwegian sealing vessel "Quest," which took part in Shackleton's last Antarctic expedition (1921-22) was broken up by pack ice off the coast of Labrador on May 5.

Four other sealers saved its crew of 23, but the Quest's catch of 5,200 seals was lost.

The Quest, built in Britain in 1917, was bought by Norwegian owners in 1923.

SEVENTH SOVIET EXPEDITION SETTLES IN

"Vodny Transport" reported on May 1 that the Soviet expedition vessel "Ob" was travelling north on the meridian 20° E., making for Cape Town after the annual change-over at the Russian Antarctic bases.

Rough weather was experienced by the "Ob" and the "Koopratsiya" in Mirny roads in early February, but unloading of cargo for the 7th Expedition was completed.

Equipment for the newly organised base in Enderby Land was taken aboard the "Ob" which then sailed west from Mirny. The "Koopratsiya" returned to the U.S.S.R.

During the first days of the voyage sunny weather was experienced, with light winds. On nearing McRobertson Land, to call in on Mawson base, the "Ob" ran into a hurricane, together with snow, and waves 10-12 metres high. Visibility was reduced to a few cable-lengths. The ship was covered with ice which had to be chipped away from the deck and superstructure. This weather lasted for two and a half days. "Ob" could not make Holme Bay until February 10. The Russians were shown round Mawson base. Amphibious cross-country vehicles with a loading capacity of five tons were placed at their disposal. Drums of aviation fuel were thus delivered ashore and stock-piled for refuelling Soviet Antarctic aircraft on flights between Mirny and Novolazarevskaya.

News was received that the Danish ice-breaker "Nella Dan", of the Australian expedition, was trapped in thick ice in the region of Vernadsky Peninsula (66° 23' S., 49° 23' E.) north of Amundsen Bay. Soviet aircraft made an ice-reconnaissance and dropped a map to the trapped ship showing its position relative to clear waters.

The voyage now continued to Enderby Land.

THE NEW STATION

The new Soviet station in Enderby Land is named Molodezhnaya. It is situated in a small mountain valley on the shores of Alasheev Bay.

Personnel were transferred ashore from "Ob" by aircraft on February 23. The temporary camp of four tents soon grew into a small town. Amenities include electric lighting in tents provided by diesel-electric power station, electric stoves, and a miniature film theatre named "Priozerny" (=Lakeside).

The station commander is V. S. Sidorov, who has twice been in command at Vostok. Radio operator P. Sorokin, mechanic N. Borovsky and cook G. Nikdaer are on their third visit to Antarctica.

This year "Ob" left Antarctic waters much later than on previous voyages. This was due to the difficult ice conditions off the coasts of Enderby Land and Queen Maud Land.

After completing research in a vast mountain region in Enderby Land west of Mirny and closing down the seasonal station Molodezhnaya on the shores of Alasheev Bay, the expedition sailed for the Princess Astrid Coast on board the "Ob", to take on board the relieved personnel of Novolazarevskaya Station, who had spent more than a year in the Antarctic.

DIFFICULT RELIEF

As the vessel approached the coast of Queen Maud Land she encountered a broad belt of heavy ice. It was already late autumn and the air temperature frequently fell below -20° C. By this time 12 explorers from Novolazarevskaya, travelling in cross-

country vehicles, had reached the old Lazarev Station (closed down last year), which is situated on an ice-shelf. Then the decision was taken to transfer them from the shore to the ship by single-engined aircraft, for which the "Ob" returned to Alasheev Bay.

The ship approached the shores of Queen Maud Land for the third time. The log contains the entry: "69° 22' lat. S., 22° 01' long. E. A vast expanse of heavy ice bars the way to the south." Reconnaissance of the ice-field began for the purpose of establishing an airstrip. A large iceberg proved suitable for take-offs and landings. Nearly 350 km. divided this airstrip from Lazarev Station.

Two aircraft were lowered on to the berg. Assembly of the engines and flight preparation commenced. Taking advantage of their anchorage, the oceanographers busied themselves with research at deep-water hydrological stations.

The planes, piloted by M. Zavyalov and L. Lyakhob, took off and headed for the Princess Astrid Coast. They carried a group of expedition members led by A. Dralkin, together with scientific equipment. On the return journey to the iceberg the pilots brought back the men being returned from Novolazarev Station. The flights continued. Soon all those who were to winter in Antarctica were gathered together at Lazarev Station and exchanging farewells, the aircrews returned to the "Ob".

The "Ob" travelled along the 20th meridian, and on May 1 was at sea between Antarctica and the Cape of Good Hope.

A radiogram received from Novolazarevskaya reports that a sledge-tractor train arrived safely at the station after completing the traverse from the coast. Soviet polar explorers at Schirmacher Oasis will be working in conjunction with Czech scientists under the leadership of Antonin Mrkos.

AT ALASHEEV BAY

A correspondent of "Vodny Transport" gives this description of the establishment of the Russian station between Mirny and Novolazarevskaya

Amidst the hills, close to an ice-covered freshwater lake, stand thirteen dome-shaped black tents, the masts of a radio-station and a group of small buildings constructed of planks. . . . This is the view presented by the camp of the Soviet polar explorers who are investigating a little-studied region in Enderby Land. "ChA" diesel generators installed in one of the tents supply the settlement with electric power, providing light, heat and hot water. Radio communication is maintained regularly between the camp, Mirny and Novolazarevskaya.

This year geologists, aerial photogrammetrists, hydrographers, astronomers, hydrologists and glaciologists are carrying out extensive operations. Dozens of flights and many landings with scientists have been accomplished in "LI-2" and "AN-6" aircraft by pilots of the Aeroflot "airfleet" aviation division in the hills and elsewhere.

The "Ob" forced its way for 34 days through a belt of heavy sea-ice before reaching the shore at Alasheev Bay in Enderby Land, where the Soviet explorers are conducting their research. In this region, compared with last year, the shore-ice has proved particularly difficult. Its average depth is approximately 1½ metres. Our vessel had to plough its way through nearly 25 miles of thick ice.

The crew members, doing an essential job in the engine-room, stuck to their task. Sometimes only 5-10 cable-lengths were covered in 24 hours. When we were about four kilometres from the shore a flag could be seen by day, placed by the hydrographers on one of the hills along the shore and at night we

could see a large electric lamp burning on the radio-station mast. The journey on foot across the ice from the ship to the shore took little more than an hour. But the large number of crevasses prevented us from using our tractors and cross-country vehicles.

And now, at last, having overcome the thick ice, our ship has reached the shore. Unloading has begun of the fuel, building materials and other equipment required to establish the new Soviet Antarctic station on the shores of Alashev Bay.

TRIANGULAR TREK

A notable event of this year was the 1,500 km. trek with caterpillar-tracked vehicles over a triangular route, Komsomolskaya-Sovietskaya-Vostok-Komsomolskaya. The task of explorers was to make accurate geodetic determinations of the elevation of the ice-cap of Eastern Antarctica. Rarefied atmosphere and heavy frosts made travelling difficult. Nearly one-third of the journey was through hitherto unexplored regions. The small group explored over 100,000 sq. km.

It was reported on January 26 that the Soviet air expedition had finished its work in Antarctica. It had accomplished in its one month of operations an "IL-18" flight to McMurdo Sound, an "An-10" flight to Vostok; and had discovered natural airstrips for heavy-wheeled craft. Vostok in future is only to be operated in summer.

The air expedition en route for Russia via Christchurch covered about 5,000 km. in nine hours over the Pacific and Indian Oceans.

A group from the 6th Expedition stayed until the end of the summer, exploring Enderby Land and the region of Novolazarevskaya Station with members of the 7th Expedition.

SCIENCE HIGHLIGHTS

A group of geologists operating from Novolazarevskaya base under the leadership of Prof. M. Ravich explored an area of 50,000 sq. km. in difficult mountain country in Queen Maud Land. An aerial photogrammetric survey was completed and nearly 4,000 rock samples collected. In the hills, marble, rock crystal, graphite, mica and other useful minerals were discovered. The work carried out by the geologists made possible the construction of valuable draft maps of the geology and geomorphology of central Queen Maud Land.

At Mirny, Novolazarevskaya and Vostok, the first Russian observations were conducted of ozone in the atmosphere.

V. Shlyakhov, leader of the aerometeorological division, with his colleagues, designed and constructed an automatic weather station. It was installed on board an "IL-14" aircraft and operated during many of the "flying laboratory's" flights over the continent. In particular, radiational heating and cooling of the atmosphere was measured over the ice cap and coast.

Practical use was made of meteorological data for weather forecasting for aircraft, whaling fleets and tankers sailing in Antarctic waters.

Many new automatic and other instruments were introduced into the laboratories at Mirny. Some were manufactured on the spot, eg., automatic weather station, snow gauge, nuclear magnetometer, earth-tremor warning system, apparatus for measuring radio-wave absorption.

The expedition's air-fleet recorded nearly 2,000 flying hours. Forty flights were made to Vostok, 1,410 km. from Mirny. Nearly 30 flights were also made to Komsomolskaya. Air strips were prepared for turbo-prop aircraft at Mirny and Bunger Hills.

SUMMER ACTIVITY AT ARGENTINE ANTARCTIC BASES

We are indebted to the Director of Instituto Antartico Argentino for the following authoritative summary of activity at the Argentine Antarctic bases during the 1961-62 summer.

POLE FLIGHT

[We are now able to give some further details of the flight mentioned briefly in our last issue.]

Two DC-3 aircraft of the Argentine Navy's Antarctic Naval Force touched down on January 6 at the Amundsen-Scott United States base at the South Pole.

The two planes, CTA 15 and CTA 12, were under the command of Capitan de Fragata Hermes J. Quijada and Teniente de Navio Jorge A. Pittaluga respectively. The aircraft had a total complement of thirteen men.

THREE HOPS

Specially equipped for Antarctic operation and with 15 years of service in Naval Aviation, the two planes took off initially from Rio Gallegas and made their first landing at Campbell airstrip near Robertson Island (65° 10' S., 59° 40' W.) off the east coast of Graham Land, a first hop of 1,600 kilometres. The crew of the ice-breaker "General San Martin" had prepared the airstrip and installed a radio-beacon.

From this strip the aircraft carried out reconnaissance and exploratory flights over the Weddell Sea until December 26, when a major flight was made along the west coast of the Weddell Sea and a landing made at the scientific station, Ellsworth, at 8 a.m. on the 27th. From here the planes flew to their destination, the South Pole, and touched down there on January 6.

HOMAGE

On arriving at the Pole Station, Captain Quijada handed over a plaque which bore an inscription

offering the homage of the Argentine Navy to Amundsen and Scott on the occasion of the 50th anniversary of their reaching the Pole.

The return flight began on January 7 after a sojourn of eight hours at the Pole station.

ELLSWORTH RELIEF

The personnel to occupy Ellsworth Station throughout 1962 left Buenos Aires on November 18 aboard the transport "Bahia Aguirre". On arrival in Antarctic waters "Bahia Aguirre" first effected the relief of the naval detachment on the Islas Orcadas (S. Orkney Islands) and then continued her voyage to the south in order to rendezvous with the ice-breaker "General San Martin" at Bahia Esperanza (Hope Bay). There the stores destined for Ellsworth Station were to be transhipped to the icebreaker.

However, the "General San Martin" did not succeed in reaching ice-free waters until January 4, having been immobilised for 22 days by heavy ice in the vicinity of Robertson Island.

ICEBREAKER IN TROUBLE

The "General San Martin's" first penetration of the ice in this area during the 1961-62 summer took place in November 1961. Under extremely rigorous ice conditions the vessel broke through in order to re-provision the Teniente Matienzo Base.

The second penetration at Robertson Island was effected on December 6. The ship was then soon trapped in the ice. Ten days later, a strong south-westerly wind somewhat relieved the ice-pressure, but after a

very short period of movement "General San Martin" was again immobilised. Reconnaissance flights with planes and helicopters showed that the heavy ice field extended in a northerly direction as far as James Ross and Cerró Nevado Islands.

RENDEZVOUS

On New Year's Day a lead began to open through which the icebreaker forced her way, at first with great difficulty, until she was at last definitely released. This series of mishaps to the icebreaker held up the projected meeting with the "Bahia Aguirre", and the rendezvous was not effected until January 5.

The "General San Martin" left Hope Bay on January 8, headed for Ellsworth Station. On board were the personnel who had been relieved and the inspection team. The vessel reached General Belgrano Base on the 16th and Ellsworth Station on the 17th.

INSTITUTE PROJECTS

During the 1961-62 summer campaign, the Argentine Antarctic Institute undertook two major assignments in the Antarctic itself, (1) glaciological work from the "General San Martin" and (2) geological and biological work on land.

GLACIOLOGY

Glaciologist Rene E. Dalinger travelled on the "Bahia Aguirre" which he boarded on November 18. At Hope Bay he transferred to the "General San Martin" which made for Robertson Island but, as mentioned above, was virtually trapped in the ice from December 9 till January 1. Dalinger eventually proceeded to the Belgrano and Ellsworth bases, returning to Buenos Aires on January 28. He was able to carry out preliminary work for a "glacier census" and to obtain the photographic coverage required for a projected ice-atlas. During the voyage he worked on the ice-atlas, while during the periods when the ship was trapped he was able to make observations on the movement of the ice.

GEOLOGY AND BIOLOGY

The geological and biological section, led by Osvaldo Shauer, embarked on the "Bahia Aguirre" on November 18 and reached the Orcadas Naval Base on the 20th. Next day "Bahia Aguirre" made for Hope Bay, arriving there on the 30th. At Hope Bay the group's investigations comprised (a) the relief of the geological expedition, which had made an extensive collection of palaeontological specimens from Mt. Flora as well as 17 oriented rock specimens for palaeontological determinations, (b) bird banding and the recording of penguin noises, (c) the collection of micro-biological specimens from the throat, rectum and intestinal tract of 31 species of Antarctic birds.

The group remained in the area until January 5.

ERUPTION NEAR S. SANDWICH ISLANDS

It was reported from London on March 19 that a vast submarine volcanic eruption had occurred near the South Sandwich Islands, 500 miles from the Antarctic.

Reports from the British Navy's ice patrol ship "Protector" said that some of her machinery had been put out of action by hundreds of small pieces of pumice stone thrown up from the sea bottom.

The ship reported that Zavodovski Island in the uninhabited group was erupting.

INDEX

An index is at present being prepared for **ANTARCTIC** — 2. **Pre-publication orders** may be sent to the Secretary, N.Z. Antarctic Society, accompanied by 2/6 per copy. For binding arrangements see last issue, page 20.

News from the Bases of the British Antarctic Survey

Reports of work carried out at eight bases of the British Antarctic Survey (formerly FIDS) during the period January–March tell of varied and widespread activities at the stations themselves and in the field.

AFTER 18 YEARS

PORT LOCKROY CLOSED DOWN

Port Lockroy, Wiencke Island, was closed down on January 16. Its programme of ionospheric and general radio research has now been integrated into the work of the geophysical observatory at the Argentine Islands and the equipment was transferred at the end of December. Port Lockroy was the second of the Survey's bases to be established in the area. It was set up as part of the war-time "Operation Tabarin" (later re-named the Falkland Islands Dependencies Survey and now known as the British Antarctic Survey) on February 16, 1944, ten days after the Deception Island base. Apart from being closed for part of 1947, 1949 and 1951, it was in operation continuously for 18 years, first as a meteorological and biological station and later as the Survey's main ionospheric station. Inospheric work is now also included in the programme at Halley Bay.

At Signy Island in the South Orkneys a general biological reconnaissance was carried out under the leadership of Dr. Martin Holdgate of the Scott Polar Research Institute, Cambridge, in order to decide on the future programme of work. A collection of fauna from soils and mosses was made with the help of a new soil extractor and shipped home for identification.

The existing biological laboratory was modified and improved, but this was a temporary measure as a new laboratory is scheduled for 1963–64.

Field work at Signy included the

ringing of some 3,000 birds — chiefly giant petrels and sheathbills.

Trial radio transmissions and "whistler" recordings were continued in February and March at Deception Island on behalf of Professor Millet Morgan of Dartmouth College, New Hampshire. These made use of the island as a slotted aerial. Transmissions were not successful but recordings of "whistlers" were obtained.

The two Otter aircraft which had been based on Adelaide Island during the summer were returned to Deception for the winter on March 19 and housed in the new hangar which had just been completed.

ON THE EAST COAST

Field work continued from Hope Bay. Geologists worked on two small islands in the southern part of Antarctic Sound, and in the north of Trinity Peninsula in the vicinity of Cape Legoupil and Mount Jacquinet. Geophysicists worked on the west coast and at the northern extremity of Trinity Peninsula and continued the magnetometer survey of Tabarin Peninsula. A new recorder was set up in the magnetometer hut at base.

Several journeys were also made south-west from Hope Bay to the subsidiary base at View Point.

OUT FROM HALLEY BAY

A full scientific programme, similar to that carried out at the Argentine Islands, was continued without interruption at Halley Bay, although it was necessary to move most of the equipment up to new huts on the surface from the old ones which are now buried under about 30 ft. of snow.

The new buildings included moulded plastic non-magnetic huts which were buried in the snow and connected by tunnels. They were found easy to handle and were erected very quickly.

A number of field journeys have been undertaken since the main summer journey to the Tottan Mountains. Tractors have now traversed the crevassed area and begun to establish depots on the inland ice.

GRAHAM LAND: WEST COAST

At **Stonington Island**, Marguerite Bay, the local geological survey was continued and a new preparatory topographical survey carried out in the southern part of George VI Sound. A geologist continued to work throughout the summer at Fossil Bluff. Physiological research was carried out at base and also on a number of journeys.

At the **Argentine Islands** the scientific programme was continued. Ionospheric work (transferred from Port Lockroy) commenced in January and the equipment for recording "whistlers" was installed. A radar windfinder was also installed.

Adelaide Island was again used as the main base for summer air operations. A total of 35 flights was made despite persistent bad weather and poor visibility, and 25 tons of supplies were taken to Fossil Bluff. A depot was also laid in the north of Adelaide Island and air reconnaissance undertaken in support of field parties in George VI Sound and to assist the ships.

Field parties of surveyors and geologists using dog-teams worked in the south of Adelaide and also on a number of small islands off the south and east coasts. The small islands visited included the Dion Islands where an Emperor penguin rookery (only the fourth then known) was discovered in 1948. A survey base line was measured by tellurometer in February.

BRITISH ANTARCTIC TERRITORY

Part of the Falkland Islands Dependencies has been created a separate colony under a High Commissioner.

Sir Edwin Arrowsmith will be High Commissioner of the new Colony named the British Antarctic Territory, which consists of all land and islands lying south of latitude 60° S. and between longitude 20° and 80° W.

It comprises the British sector of the Antarctic, including the Graham Land Peninsula, the South Shetlands, South Orkneys, and other islands.

Other dependencies (South Georgia and the South Sandwich Islands) which lie outside the treaty area will continue as dependencies of the Falkland Islands.

A new series of postage stamps, ranging in denomination from ½d. to £1, is being prepared for the British Antarctic Territory.

SHIP MOVEMENTS FOR ANNUAL RELIEF

R.R.S. "Shackleton" left the Falkland Islands on February 23 for her third southern voyage this season. She again visited Hope Bay and then managed to take supplies into the subsidiary base at View Point in Duse Bay—an area which is often blocked by heavy pack ice from the Weddell Sea. She then proceeded to Deception Island in the South Shetlands, which is a regular port of call for the relief ships, partly because of its central position on the routes between the bases and partly because of its excellent harbour which occupies the crater of the old volcano.

"Shackleton" then sailed down the west coast of Graham Land to Port Lockroy and the Argentine Islands and delivered her cargo of fuel to the

"Biscoe" at the southernmost point of Adelaide Island on March 7. She arrived back at the Falklands a week later and sailed again on March 17 with a cargo of mutton for South Georgia. When this commission had been completed, she called at Bird Island at the western end of South Georgia and picked up two ex-Survey ornithologists who had been working there for U.S.A.R.P. (United States Antarctic Research Program). After re-visiting the South Orkneys and South Shetlands she returned to the Falklands on April 3. On her fourth summer voyage which commenced three days later she paid the final visit of the season to the Argentine Islands, Deception Island and Hope Bay.

R.R.S. "John Biscoe" had meanwhile been held up at Adelaide Island by bad weather which delayed the flying programme for which she was acting as control. Both Stonington and the advance base at Fossil Bluff in George VI Sound had been relieved by air at the end of January, but the ship took the bulk of the year's supplies into Stonington on March 25. Unloading took three days, and the ship then picked up a party which had been landed on Jenny Island on the way in, and returned to Adelaide. She then proceeded northwards and re-visited Deception, Hope Bay and the South Orkneys and called at South Georgia on April 6. She sailed two days later for the Falklands and eventually arrived back at Southampton on May 22. Among the 30 men on board, returning from the bases, were two of the three men who had wintered at Fossil Bluff (71° 20' S.) in 1961.

M.V. "Kista Dan" arrived at Southampton on March 26, with personnel from Halley Bay at the head of the Weddell Sea.

LOFTY MOUNTAIN AREA TO BE SURVEYED

Plans are being considered for a New Zealand expedition to penetrate an unexplored region of Antarctica containing what is believed to be the continent's highest mountain.

Mr. J. H. Miller, the Wellington surveyor who served as deputy leader of Sir Edmund Hillary's Antarctic party in 1957-58, hopes to lead a surveying and scientific party into the area in about two years' time.

He has seen the mountain from a distance by air and estimates that it is almost 20,000 feet high. The mountain is probably part of the Admiralty Range, lying inland from Hallett Station, the joint American-New Zealand scientific base. Mr. Miller thinks it may be one of the mountains sighted from off the coast by Sir James Clark Ross in 1841.

It is not proposed to attempt to climb the mountain. The first thing is to get in and map the area. This would be done as part of the official New Zealand programme to map the whole of the Ross Dependency.

NOW THERE ARE THREE !

We are delighted to apologise to a third veteran of Captain's Scott's first ("Discovery") Antarctic expedition. In a reference in our last issue to the death of Captain Barne, it was stated that Mr. C. R. Ford and Mr. C. H. Hare were now the sole survivors of the 1902-04 expedition.

In a letter to "Antarctic" dated May 10, Mr. Ford writes, "I was surprised to hear from England this week that Jimmy Dell (A.B. in "Discovery") is alive and well. He has recently married again at the age of 83 or more, and my informant says 'is full of beans'!"

So hats off to Jimmy Dell.

THE READER WRITES

Sidelights of Antarctic Research

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

RECORD ALTITUDE FOR DOGS?

Sir,—In December 1961, two teams of dogs of the New Zealand "Southern Party" (nine dogs in each team), climbed to 12,000 feet above sea level, to a dome on the edge of the polar plateau at the head of the Keltie Glacier. This is claimed, provisionally, as a world record altitude for sledge-dogs, the height being subject to further computation. Each team pulled 450 lb. and were at that altitude for 24 hours.

A total of 84 days were spent on the polar plateau, where the mean altitude of the camps was 9,100 feet. The lowest altitude during that period was 7,200 feet above sea level. The dogs were being fed $1\frac{1}{2}$ blocks of pemmican a day, and did not appear to suffer from breathlessness or altitude lassitude.

If any reader of "Antarctic" knows of higher altitudes reached by sledge-dogs it would be interesting to have particulars; also details of other high altitude sledge journeys of comparable duration.

W. W. HERBERT.

NEW ISLAND

The U.S.S. Glacier reported the discovery of a new island off the Hobbs Coast of Marie Byrd Land during an eastern probe round the Antarctic coast from McMurdo Sound.

The island was distinguished from huge grounded icebergs by rocky edges two miles square with perpendicular sides thrusting 1,000ft. up.

"THE THING"

The Antarctic has invaded "Science Fiction". An Australian newspaper is publishing a serial the first episode of which begins:

"The Place Stank. A queer, mingled stench that only the ice-bound cabins of an Antarctic camp know.

"Yet, somehow, through all that reek of human beings and their associates — dogs, machines and cooking — came another taint.

"It was a queer, neck-ruffling thing, a faintest suggestion of an odor alien among the smells of industry and life. And it was a life-smell."

Dear! Dear! And we had always thought of the Antarctic as a clean place. But this gentleman obviously knows. . . .

IS YOUR SUBSCRIPTION DUE?

Subscriptions to "Antarctic" (15/- N.Z. currency) are now due: also due are subscriptions for membership of the N.Z. Antarctic Society (25/-, which includes subscription to "Antarctic").

Your account will be forwarded in due course, but if you intend to remain a subscriber, or member, it would be appreciated if you would forward your subscription immediately, and thus reduce the clerical work which otherwise falls on busy voluntary helpers.

Please forward subscriptions to the Secretary, New Zealand Antarctic Society, P.O. Box 2110, Wellington, New Zealand.

News from Sub-Antarctic Islands

CAMPBELL ISLAND

(N.Z.)

The present expedition now in the throes of the winter period has been restricted in field activities. However, apart from their routine maintenance, everyone is concentrating on painting the main hostel and bedrooms.

All members are in good health and under the leadership of Colin Clark morale has been excellent. Preparations are now in hand for the all important mid-winter's day, and members are looking forward to the celebrations.

Very good results have been obtained in the numbers of birds banded, one point of interest being in the finding of an albatross banded by SORENSON No. A11, dated February, 1943. As these birds do not breed until six years of age, this fellow is well on the way to the old age pension.

The recruitment programme for next year's expedition is under way, and interviews will be carried out in June; by the response to the advertisements, it is expected that the calibre of the expedition will be good.

The Meteorological Observers for next year have already been chosen; they are: A. P. Fox, J. F. Washer and J. P. Squibb. Messrs. Fox and Washer will proceed to the Island in September, as also will the selected Radio Technician.

U.S. DISPLAY

The people of Denver, Colorado, will soon know more about New Zealand's Campbell Island than most New Zealanders.

The Denver Museum of Natural History is completing a display of the island's wildlife which will be

visited by 700,000 people a year. The exhibit is 96 feet wide, 40 feet high and 30 feet deep.

In addition, the museum authorities have produced "Sub-Antarctic Campbell Island," the most comprehensive account yet made of the island. It is written by Mr. J. H. Sorensen who was stationed there for more than four years, and the Museum's Director, Mr. A. M. Bailey, who visited the island with a museum expedition in 1958.

All the mammals, fur and elephant seals, and many of the different types of penguins and other birds of the island are being assembled in the museum. Backdrops are being painted by William Traher, who visited the island to see their natural habitat.

MACQUARIE ISLAND

(Australia)

Macquarie conditions in January were average: Temperature, an average of 44°; average daily rain — 9 points over 29 days of the month; a heat wave one day of 50°; maximum wind of 60 knots.

American geophysical work was progressing well but the lack of solar activity and major magnetic disturbances was disappointing.

The two biologists made a trip around the island via the coast in search of branded elephant seals and banded penguins. They also erected a pre-fab ANARE-type aluminium hut at Caroline Cove.

Evans and Stalker made two trips to Prion Lake. They carried out mid-night plankton hauls and installed temperature and wind speed recorders.

The island provided radio navigational assistance to Russian aircraft flying from Mirny to Christchurch.

A party of six carried 300lb. to Bauer Bay. Leaving camp at 0330 they erected an ANARE-type aluminium hut and returned home at 1830, very much fatigued.

While the cook was away at Bauer Bay for penguin banding for three days the O.I.C. and 2nd I.C. held the fort in the kitchen. There was much rejoicing on the cook's return.

OPERATION HORNS

The doctor successfully performed an urgent delicate operation. The patient was "Tom" the bull. "Tom" had been waging total war on the store doors and windows with his horns and winning the battle of nerves. With Macquarieites scurrying across the isthmus late at night, we decided for the safety of the building, the men would have to amputate his battle equipment. With "Tom" roped-down and injected with "Pentathol" — without result, in desperation a kitbag, containing a large swab of cottonwool saturated with chloroform, was fastened over his head and the patient was anaesthetised in 15 minutes, with no breathing troubles. At what stage anaesthesia was reached is uncertain. Ten minutes and a tenon-saw later, "Tom," unarmed, took three hours to regain his feet, during which time the O.I.C. and "Doc" kept the skuas and gulls at bay. For the next few days "Tom" remained a brown dot in the distance.

The Americans along with several members of the ANARE party, had many hectic moments launching balloons to coordinate with similar launchings in Alaska. Their labour and anxiety was rewarded on 6th March with a fifty-fold increase of cosmic activity successfully recorded by balloon.

FIELD TRIPS

Trips were made in soaking-rain, following a staked trail through dense fog, as part of a long-term study of seal life history. In the caves along the west coast, several

bones of Rail, a flightless bird, now extinct, were found.

The month's highlights were the separate arrival of the "Nella" and the "Thala" on their return from the continent. "Thala" arrived on March 2 in glorious weather. The welcome returning Wilkes' party saw the first green vegetation in fifteen months. Helicopters made effortless the task of delivering stores to scattered inaccessible huts.

The "Nella" arrived on the 12th, in a heavy swell which prevented mail being brought ashore. The following morning the DUKWs came ashore with the parties from Davis and Mawson. Heavy surf and ocean swell caused landing operations to cease early forenoon — result 43 bodies marooned, ashore. The meals overnight were a wonder and the 63 overnight-population a record at Macquarie. Bodies lay sprawled everywhere. McNair rose to the gigantic task of supplying plenty of good food for everyone.

The "Nella Dan" brought back a team of U.S. and Australian scientists who had completed a three-month series of geophysical measurements on the island.

The team launched 23 helium-filled plastic balloons which carried instruments for measuring radiation near the top of the atmosphere.

Their readings will be compared with simultaneous measurements taken at a Northern Hemisphere site.

The comparison is expected to add considerably to knowledge of the complex geophysical effects of disturbances on the sun's surface.

APRIL DAYS

Pedersen's latest report says:

The month of April was blustering in with heavy gales; the force of penetrating winds frequently exceeding 50 m.p.h., accompanied by the ever-pounding seas. Drizzle and mist remained our constant companions throughout the month, supported by much snow, hail and sleet. We had two sunny days, without wind, which

enticed the Met. men to take a swim in the sea. We are told that their exit was in keeping with our wind velocities.

The O.I.C. and Goodall went to Lusitania Bay to repair the hut. Departure from camp was late and they found themselves in the dark, temporarily unsure of their position and off the staked trail. The gallant pair literally slid down the scree slopes in the darkness, making Green Gorge by torchlight, and eventually reached Lusitania hut, having been joined by Nicholls. They carried out repairs to the roof, etc., and spent the rest of the week following Nicholls around the beaches on his seal searches.

Outside work, with the exception of biological field trips, has been restricted. A party moved to Bauer Bay 200 pegs for a grid on the Royal Penguin rookery, along with some building material for the construction of a "Hide" on the 12-foot observation tower at Bauer. The "Hide" was made from shipwreck driftwood that was collected from around the beach area. Really bush carpentry!

"Fred" and "Freda," our two pigs, have such firm friends in the camp that the O.I.C. still considers them to be more useful as kitchen garbage disposal units than as food potential.

Dwyer had a little seal trouble in his hot house. It would seem by the evidence, circumstantial, that a seal intruded through a glass panel and crawled around his beds through the nearly mature lettuce, cabbage, red beet, etc., with sad results.

KIWI TO LEAD

Canberra reported on June 21 that New Zealander Bob Thompson, officer in charge at the Australian-manned Wilkes Station, will lead a major Australian journey next summer. The object will be to carry out seismic ice depth measurements for 850 miles inland from Wilkes to link up the work of Australians in 1961 with seismic work done by the Russians at Vostok.

T.A.A.F.

During the 1961-62 summer an unusually extensive programme was undertaken by the French organisation responsible for Terres Australes et Antarctiques Francaises, in the course of which the relief-ship "Gallieni" made two voyages at an interval of 40 days. The relief programme also covers the island of Nouvelle Amsterdam, further north, which is also administered by T.A.A.F.

ARCHIPEL CROZET

(France)

A team of 12 men was landed on Possession Island in the Crozet group, till then unoccupied. The helicopter carried on the island's relief-ship "Gallieni" made it possible to carry out a complete reconnaissance of the archipelago for the first time. During this reconnaissance glaciological and geological surveys were made.

Between December 20 and 24, 1961, thirteen men and 42 tons of supplies and equipment were landed on the beach at "la crique du Navire." This was carried out with the aid of pneumatic floats towed by the "Gallieni's" motor-boats. Seven metal huts were erected to house the team, which included two cartographers, two naturalists and a meteorologist whose task it was to select the site for the proposed meteorological station.

Despite the rigorous weather conditions the team was able to carry out successfully, during the 40 days spent on the island, the planned programme in geodesy and natural science. The use of the helicopter enabled the topographic group to measure a base line of approximately six kilometres by tellurometer.

It became apparent that it would be impracticable to establish a permanent station except at some distance from the marshy coast, on a plateau 134m. (438ft.) above sea-level. This will entail the installation of a cable railway.

ILES KERGUELEN (France)

This was the first time in the history of Kerguelen that a double voyage has had to be made to effect the relief of the Island stations. 68 men were involved in the Kerguelen relief alone, among them five meteorologists and 18 other scientists. 1300 tons of cargo had to be taken ashore.

The summer programme included the reorganisation, under the supervision of visiting specialists, of the work in terrestrial magnetism, cosmic rays, aurora and airglow, ionosphere and whistlers. Observations in these fields were designed to detect the arrival in the upper atmosphere of X-rays and protons. Professor Blamont, Scientific Director of the National Centre of Space Studies, was in charge of the programme, which involved sending "scintillateurs" (a type of Geiger counter) to a height of 45,000 metres (147,000ft.) and keeping them there as long as possible, supported by hydrogen-filled balloons. This programme was carried out in conjunction with American and Russian observations.

The major difficulty was the wind. A porous metal shelter wall nearly 60 feet high and 90 feet long made it possible to send balloons up in winds of up to 15 m. per second (30 m.p.h.). Successful balloon-launchings were also made from the "Gallieni."

Two "Alouette II" helicopters were used to make a successful reconnaissance of the island, still little known, and to carry out observations in geodesy, glaciology and geology. The glaciological work included an inventory of the glaciers, the identification and counting of glaciers and ice-domes and their overflows, the drawing up of a provisional map and the estimation of the annual accumulation. This reconnaissance covered practically the whole archipelago.

MARION ISLAND (South Africa)

Although it did not enjoy the splendour of a White Christmas, Marion welcomed the New Year adorned in a lily-white garb which, as a matter of fact, was the only snow precipitation for the month. There was also a complete calm day. A phenomenon of this kind is extremely rare and seldom experienced.

All were satisfied with the New Year's messages broadcast by Radio South Africa. They made a successful recording of it on a tape-recorder and played it back afterwards so that the men could hear the voices of their beloved again. It rained throughout the last two days of the Old Year which gave the impression that the Old Year had been washed off and blown away. A strong wind accompanied the continuous rain.

January had several high-lights. Piet le Roux, Toby Mynhardt, Chris Snyman, Christo Wolfaardt and Burnie Booyens decided to climb Jan Smuts Peak, at 4,200 feet the highest peak on the island. This they did. On their return a fog descended upon them and they lost their way. Fortunately after some aimless wandering they arrived at a stream which they recognised and after following it for some distance they arrived back at the station late that night.

January was a rainy month. The average precipitation of 196 mm for January was exceeded by a total of 268 mm. A mild precipitation resembling frozen rain also occurred during the month. The sun seldom made an appearance and they had to be satisfied with 119 sunshine hours altogether, which is a daily average of 3.8 hours.

During February a visit was paid to Crawford's Bay and from there back along the coast to Kildalkey Bay. In Kildalkey Bay there is not only the biggest Macaroni Penguin rookery on the island but also prob-

ably the second biggest King Penguin rookery. It is virtually impossible to make an accurate estimate of the number of penguins but there must be millions. The entire walk of about 30 km took 10 hours.

A whaling fleet of five ships visited the island and vicinity. No one could identify the fleet and unfortunately they did not land. One of the vessels came to a halt close to the station but did not drop anchor. After hoisting the flag, the South Africans watched through binoculars and theodolite for about ten minutes. Signalling between them and the vessel did not help very much — all that could be understood was the word "Japan". They were anxious to invite the visitors to coffee but evidently they could not understand and slowly disappeared over the eastern horizon.

SOCIETY NEWS

Mr. J. H. (Bob) Miller has been re-elected President of the N.Z. Antarctic Society, and of the Wellington Branch. Vice-Presidents of the national body are Mr. A. Leigh Hunt (its founder, and still an active member) and Mr. Murray Ellis of the T.A.E., President of the Dunedin Branch.

Mrs. R. W. Balham has resigned the secretaryship, and has been followed by Mr. W. J. P. (Peter) Macdonald, who was a member of the I.G.Y. party at Scott Base in 1957.

DUNEDIN BRANCH

At the annual meeting of the Dunedin Branch on March 29, a 16 mm. print of the film "Scott of the Antarctic", with John Mills as Scott, was screened.

At the branch's request, the Port Chalmers Borough Council gave the Scott Memorial at the Port a clean-up. The surrounds had become overgrown and they were trimmed back.

BOOKSHELF

"GEOPHYSICAL STUDIES IN VICTORIA LAND, ANTARCTICA":

John G. Weihaupt, 123 pp., illustrations, charts and diagrams.

While the latter portion of this first "research report" of the University of Wisconsin Geophysical and Polar Research Centre will be of interest rather to the specialist than to the ordinary person interested in the Antarctic, the first 52 pages give an admirably lucid picture of the Victoria Land Traverse, 1959-60, which left Scott Base on October 16, 1959, in three sno-cats, ascended the Skelton Glacier to the Victoria Land Plateau, travelled overland northwest to the end point of the French traverse of 1957-58, and then moved east towards the coast south of Hallet Station. (See "Antarctic" June, 1960.) The team comprised five Americans, one Dutchman, one Frenchman and one New Zealander (Arnold Heine).

The party discovered two major topographical features, the Arctic Institute Range and the Rennick Glacier (50 km wide and 260 km long) and proved that the ice cap, in places over two kilometres in thickness, covers a great depression. This volume is a worthy account of a notable journey which altered our whole conception of that portion of the Antarctic which lies nearest to our own land.

A limited number of these reports is available to scientific and educational institutions on application to the author, University of Wisconsin, 6021 South Highland Road, The Highlands, Madison 5, Wisconsin, U.S.A.

"ECOLOGIE DU MANCHOT EM-

PEREUR": Jean Prevost. Expeditions Polaires Francaises publication No. 222: Hermann, Paris. 201 pages, illustrations and diagrams.

This companion volume to "Ecologie du Manchot Adélie" by Sapin-

Jaloustre (reviewed "Antarctic" vol. 2 No. 10) is written by the naturalist of the French Adélie Land expeditions of 1952 and 1956, who devoted two years to the study of Emperor penguins at the great rookery of 12,500 birds discovered at Pointe Géologie in 1950 by Sapin-Jaloustre. No man is therefore better qualified to describe the life-history and behaviour patterns of the Emperor, and the interest and reliability of the volume are made none the less impressive by Dr. Prevost's modest avowal "We certainly make no pretention to have analysed fully the ecology of this paradoxical bird . . . on the contrary. In the course of this study, numerous obscure points have appeared which demand clarification. But this first contribution will perhaps enable other students to undertake more profound study".

It is to be hoped that this valuable volume will shortly be published in an English edition.

"GLACIOLOGY IN EASTERN QUEEN MAUD LAND": W. de Breuck. Preliminary report Third Belgian Antarctic Expedition 1960.

This 15 page forerunner to the full glaciological report to be published later this year is a model of how a scientific report can be made intelligible to the layman. The report, in English, is written clearly with a minimum of jargon: it is helpfully illustrated with good photographs and diagrams, and it is attractively set out.

"A SELECT BIBLIOGRAPHY OF THE POLAR REGIONS": John Hanesian, Jr., American Universities Field Staff Inc. (366 Madison Ave., New York, N.Y., U.S.A.). 30 pp.

Dr. Hanesian is well known as an authority on, especially, international legal problems connected with the Polar regions. His studies have taken him into both the Arctic and the Antarctic, as well as to Polar study centres in many parts of the

world. He is therefore unusually well equipped to compile such a bibliography as this, which lists over 400 works of particular interest to students of international affairs in so far as they affect the Polar regions, but of value also to all who are interested in the Antarctic.

PUBLISHED IN NEW ZEALAND

Geological Investigations in Southern Victoria Land, Antarctica. Part 3 — Geology of Wright Valley: B. C. McKelvey and P. N. Webb. In N.Z. Jnl. Geol. and Geophys. 5 (1). February 1962.

Part 6 — Outline of the Geology of the Victoria Valley Region: A. D. Allen and G. W. Gibson.

Part 7 — Formations of the Beacon Group in the Victoria Valley Region: A. D. Allen.

In N.Z. Jnl. Geol. and Geophys. 5. (2) May 1962.

Thickness of the Earth's Crust beneath the Campbell Plateau: R. D. Adams: in N.Z. Jnl. Geol. and Geophys. 5: 1, Feb. 1962.

BOOKS TO COME

One Foot at the Pole, by Jim Henderson. Whitcombe and Tombs.

Opposite Poles, by Douglas McKenzie. Whitcombe and Tombs.

Sub-Antarctic Campbell Island: A. M. Bailey (Director Denver Museum) and J. H. Sorensen (acting Chief Inspector of Fisheries, N.Z. Marine Dept.). Denver Museum, U.S.A.

Two Huts in the Antarctic: L. B. Quartermain, for Antarctic Division, D.S.I.R. Government Printer.

The above books are either very recently published or are in the press.

NEW ANTARCTIC MAP

Among the better known and readily accessible maps of pre-IGY Antarctica has been the excellent map published in 1956 by the American Geographical Society. The following up of aerial reconnaissance by the careful surveying of large areas of the Antarctic by ground teams using motor vehicles and dogs has led in the past few years to a dramatic extension of the "known" areas. The Society has now published a new map incorporating the features discovered since its earlier map was produced.

It is in every way a worthy successor. Similar in general appearance and again using blue on white with black printing, it is rather larger, measuring 42 inches by 56, and is more bold in appearance. It depicts the whole Antarctic area south of 63°S. on a scale of 1:5,000,000. Unlike the older map, it is oriented with 0° Longitude (not 90°E.) at the top of the map. This is standard modern practice and has the added advantage for New Zealanders that one is looking directly across the Ross Sea to the Pole as we actually do.

The map includes a very great number of features not known when the earlier map was produced, and many areas are shown to have a topography quite different from that previously assumed. The old "Thurston Peninsula" for example is now shown as an island. The manned stations are all indicated and so are the major traverses of the IGY and post-IGY periods up to and including the 1960-61 summer. Also shown, actually, is the route of the Ellsworth Land traverse of 1961-62.

In one of three new and useful insets the sub-glacial and sub-marine topography is shown; inevitably, this is only a "pro-tem" delineation, since the shape of the land beneath the ice-cap is not yet by any means fully known. Another inset map is of the

McMurdo Sound region (scale 1:1,000,000), and the third is an elliptical map of the world on an equal-area projection with the South Pole in the centre.

This latest of all-Antarctica maps may be purchased for \$2.00 if sent folded, \$3.00 if sent in a mailing tube rolled. This includes postage. Apply to the American Geographical Society, Broadway, at 156th Street, New York 32, N.Y., U.S.A.

ANTARCTIC SOCIETY'S NEW BOOK

As a result of the remarkable success of the Society's book "The Antarctic Today", published in 1952, the New Zealand Antarctic Society has decided to produce a new book covering all facets of scientific work in the Antarctic. The editor of this new volume is Dr. Trevor Hatherton, who was chief scientist of New Zealand's I.G.Y. party at Scott Base, and the authors will all be outstanding authorities in their respective spheres who are, moreover, still active in Antarctic research work. A number of the articles are already in hand.

The book has not yet been titled, and readers are invited to forward suggestions, which the Editor will be pleased to pass on to the Society's Council.

If any readers have or know of outstanding photographs of unusual Antarctic phenomena it will be appreciated if they will inform Dr. Hatherton. The Society is anxious to ensure that the new book will provide the finest possible photographic coverage.

The New Zealand Antarctic Society

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

You are invited to become a member.

BRANCH SECRETARIES

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

Canterbury: J. H. M. Williams, 85 Waimea Terrace, Ch'ch.

Dunedin: J. H. McGhie, Box 34, Dunedin.

"THE ANTARCTIC TODAY"

This volume is out of print, but a limited number of the following **separate sections** is available, the stapling slightly rusted:

Ionosphere Research (J. W. Beagley).

Meteorology (A. R. Martin).

Marine Biology (R. K. Dell).

Aurora Australis (I. L. Thomsen).

The Nations in the Antarctic (recent Australian, South African, French, etc., exploration by leading experts in the countries concerned).

These separates are available at a cost of four shillings each from the Secretary, N.Z. Antarctic Society.

"ANTARCTIC"

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