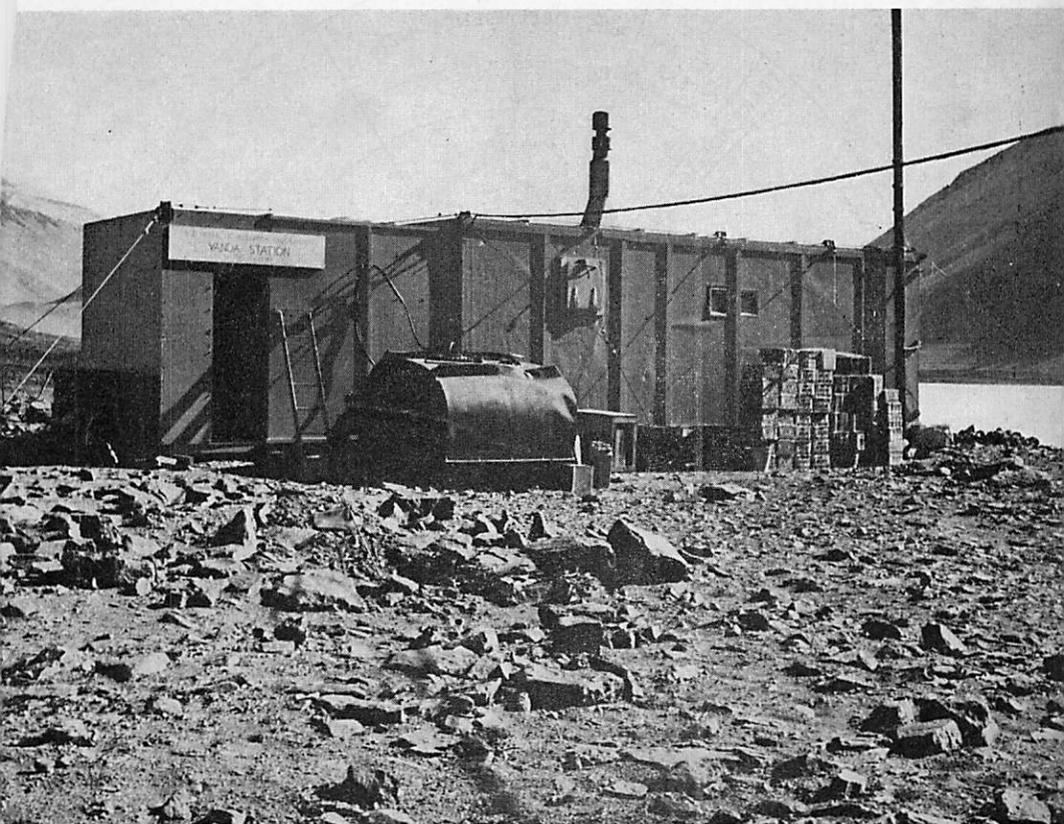


ANTARCTIC

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(Photo: H. Orr)

VANDA STATION.

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NEW ZEALAND ANTARCTIC NEWS

New Leader at Scott Base

The new leader at Scott Base for the 1969-70 season is to be Robert Bruce Willis of Roxburgh, Central Otago. Aged 40, Mr. Willis is married with four children. He was educated at Southbridge District High School, Christchurch Boys' High School and Christchurch Teachers' College.

A school teacher, Mr. Willis has taught at Southbridge District High School, Rakaia, Otematata District High School, Benmore, and since 1966 at Roxburgh District High School.

He has been an active member of the New Zealand Alpine Club for a number of years, during which he has undertaken many major climbs and been involved in search and rescue operations throughout the Canterbury/Otago area. He is very active in many sports, particularly Rugby which he has refereed in mid-Canterbury/Otago.

Mr. Willis first went to Antarctica as a Field Party Leader in the summer season of 1966-67. He worked from Hallett Station for most of this period and also led a scientific expedition to the top of Mount Erebus.

Mr. Willis commenced duty with Antarctic Division, D.S.I.R., in Wellington on May 12 and will proceed to Scott Base in early October to relieve the present Leader, Mr. R. Foubister, of Christchurch.

First Lady for Scott Base

Mrs. P. Young, of Christchurch, will be the first New Zealand woman to work as a member of a New Zealand research expedition in the Antarctic.

Mrs. Young will leave for Scott Base early in November and within a few days will be flown to Cape Bird where she will join her husband, Dr. E. C. Young, leader of the University of Canterbury Antarctic unit, and three students from the university.

The unit will work on zoological studies, primarily the behaviour of Antarctic birds.

An arts graduate, Mrs. Young, whose husband is a senior lecturer in zoology at the university and warden of Rolleston House, will be a field assistant doing technical work and general housekeeping previously done by university undergraduates.

Mrs. Young was thrilled when she heard of her selection on June 24. She said she had done a lot of tramping, but no mountaineering, but did not think mountaineering experience would be needed as Cape Bird, where her husband had been before, was rocky.

Her selection was announced on June 24 by Mr. R. B. Thomson, Superintendent of the Antarctic Division of the Department of Scientific and Industrial Research. Until now logistics and accommodation restrictions had precluded the inclusion of women in Antarctic teams, he said.

To qualify for inclusion in scientific teams women would have to be at least as well qualified as men, well experienced in the outdoors, pass psychological tests, and undertake the same Antarctic training programme as men.

Cape Bird, where Mrs. Young will be working, is the north-western extremity of Ross Island. It was discovered and named in 1841 by Admiral James Clark Ross for Lieutenant Edward J. Bird, the senior lieutenant of the "Erebus," one of the two ships of Ross's expedition.

Will Tourists Fly To Antarctica?

Air New Zealand could well be flying tourists to the Antarctic in January, 1971, if permission is forthcoming from the United States military authorities in the area.

The service would be flown by DC8 jet airliners from Christchurch to Scott Base with accommodation provided by a liner in McMurdo Sound.

A DC8 would make the 2,400-mile journey in between four and five hours, which does not rule out the possibility of day trips.

If the service does eventuate, the airline will fly between five and eight services between mid-January and mid-February to coincide with the best of the Antarctic weather.

Permission has been granted by the military authorities for an investigation team to make an inspection in November. It will comprise two DC8 captains, an engineer, and two members of the Civil Aviation Division of the Ministry of Transport.

Midwinter Celebrations

Midwinter's day was celebrated for the first time at New Zealand's new Antarctic base at lonely Lake Vanda, while Scott Base enjoyed its traditional feast.

Eighty miles of Antarctic darkness separated the four New Zealanders and one American exchange scientist at Lake Vanda from the 11 New Zealanders at Scott Base.

Good-will messages were swapped with the bases of other nations spread around the continent, and many messages were received from friends and relatives in New Zealand and other countries.

Elk Disappears

A stuffed elk head mysteriously disappeared from Scott Base recently. When the American Coastguard

Cutter "Burton Island" was in Wellington its commanding officer, Captain Bain Leland, bought a miniature manufactured elk head.

He later sent this to Captain Hugh Kelley, Commander Antarctic Support activities. With it was a letter:

"'Burton Island' always returns goods which have been appropriated inadvertently from other commands. I greatly regret the reduction in size, but shrinkage in high winds and seas is always a factor to be reckoned with."

ANTARCTIC PLACE NAMES

At its recent meeting in Wellington the New Zealand Antarctic Place Names Committee approved the names for 171 features in the Ross Dependency. Among these was a large area between Cape Dayman in the north and Cape Moore in the east, and bounded by the Barnett Glacier, which has been named the Tapsell Foreland.

The name was suggested to the Committee by Dr. R. A. Falla, one of its members. This is a most appropriate name indeed, for Captain Tapsell was the master of the barque "Brisk," one of the whaling vessels based on the Enderby Settlement at Port Ross, Auckland Islands, 1849-52. In an exploratory voyage in February 1850, Tapsell sailed south to the Balleny Islands and then westward along the 67th degree of south latitude as far as longitude 143°E. Not only was this further south than the earlier course of Wilkes in the same sector, but it was so close to the now known position of the coastline at several points that only the worst of visibility could have obscured sight of the land. The continued bad weather prevented any whale hunting, and no land was seen.

The voyage was briefly described by Enderby at a meeting of the Royal Geographical Society in 1858, and mention was then made that the log and journal of the voyage had accountably been lost.

New Zealand Antarctic Programme

For 1969/70

A total of 83 New Zealand personnel will be involved in the field work during the 1969/70 summer season and for scientific observations at Scott Base and Vanda Station until the spring of 1970. The scale of activities is the same as that recommended for 1968/69 although, principally for financial reasons, Government geological and soil field activities were not implemented during the 1968/69 summer season.

PROPOSALS

A. Scott Base

The studies in auroral physics, earth currents, geomagnetism, ionospheric physics, meteorology, radio propagation and seismology should be continued. However, some changes to the auroral programme will be necessary for the measurement of auroral heights in co-operation with Vanda Station, and also to the ionospheric physics programme for the measurement of angle-of-arrival of disturbances.

This will involve a wintering-over party of ten as for 1968/69 which is one less than for 1967/68 and two less than for 1966/67.

(Participating Organisations: DSIR, N.Z. Meteorological Service, University of Auckland.)

B. Vanda Station

The studies in earth currents, geomagnetism, meteorology and seismology should be continued and the studies in VLF propagation expanded to include whistler recording in association with similar work at Scott Base. In addition, parallax observations should be carried out in conjunction with Scott Base for the measurement of auroral heights.

The wintering-over party should also make observations of the "hot" lake level, temperature and chemistry at regular intervals and carry out observations as required to supplement work carried out by summer parties in the Dry Valley area.

This will involve a wintering-over party of four New Zealanders and one American exchange scientist as for 1968/69.

(Participating Organisations: DSIR, N.Z. Meteorological Service, University of Otago, University of Wellington.)

C. DSIR Geological and Soil Studies

(a) A four-man party should spend about six weeks studying the granitic complex and precambrian basement rocks of the Terra Nova Bay area extending north to Mt. Dickason. This complements work undertaken further north during previous years.

(b) A six-man party should spend about eight weeks studying the geology, geomorphology, glacial history and soil conditions of the Scott Glacier area between the Polar Plateau and the Ross Ice Shelf. On completion, the two pedologists should spend two weeks studying soil processes in the Taylor and Wright Valleys.

Note: These field expeditions were recommended for the 1968/69 programme but, due to the current economic conditions, could not be implemented.

D. Victoria University of Wellington Expedition

(a) A four-man party should spend about six weeks continuing

stratigraphic studies of glacial and marine sediments in the Dry Valleys and on raised beaches and promontories bordering the Ross Sea.

- (b) A four-man party should spend six to eight weeks principally studying the geochemistry of Antarctic lakes, particularly with a view to deducing past climatic and glacial events.

E. Glaciology

The detailed study by DSIR of the McMurdo Ice Shelf between Ross Island and the Mainland should be completed during the 1969/70 summer. Manpower requirements will be three men for three to four months. This party should also carry out hydrological measurements and complete the surveying programme in the Vanda Station area.

F. Nuclear Sampling

The DSIR air and snow sampling programme to provide basic data on isotopes occurring both naturally and as a result of nuclear explosions should be continued. Staff engaged on other projects should be used for such work.

G. Oceanography

- (a) HMNZS "Endeavour's" resupply routes should be planned on preferred meridians to obtain bathymetric, temperature, proton magnetometer and sediment thickness and stratification profiles which complement previous work.

(Participating Organisations: DSIR, University of Wellington.)

- (b) Auckland University should undertake studies of the attenuation and transmission of underwater sound in Antarctic waters; and continuous recording of ambient sea noise, marine biological noises, earthquakes, etc. This programme would involve one man from Auckland University for four to six weeks, the remainder being done by staff engaged on other projects.

H. University of Canterbury — Antarctic Biological Unit

- (a) A two-man party should spend several weeks continuing the

population studies of the Weddell seal in the southern part of McMurdo Sound. This project is essential for conservation purposes.

- (b) A four- to five-man party should spend three to four months at Cape Bird. They should principally be engaged on the continuation of the penguin and skua studies.

I. University of Otago — Biological Studies

A two- to three-man party should be stationed at Hallett Station for about three months, principally to make the annual census of Adelie penguins, continue the plankton studies, and, if possible, make ecological studies of the two petrel species.

CHESS CHAMPIONSHIP AGAIN BEING PLAYED

The second Antarctic international chess competition is again under way.

Six nations and 14 stations are taking part.

Though the moves will be transmitted by radio, atmospheric interference may extend some of the matches from days to weeks, and even months.

To ease the monotony, the 1968 winter party at Byrd Station issued the first Antarctic challenge and seven nations took part in last year's contest.

Duplicate chess boards were hung on the mess deck wall, with plastic markers representing the pieces so that the progress of each match could be followed.

The 1969 challenge was accepted from stations in every sector of the Antarctic. Those participating include Mirny, Vostock, Bellingshausen and Molodezhnaya (Russia), Argentine Island, Halley Bay and Stonington Island (British), Scott Base and Vanda Station (New Zealand), South Pole and McMurdo Stations (American), and Kerguelen (French).

Victoria Scientists Make Key Fossil Discoveries In Antarctic

Major scientific finds by the Victoria University Antarctic Expedition in Victoria Land mountains this year were revealed by two expedition members on April 30.

They included a further link between Antarctica and the ancient Gondwanaland from which all continents are considered to have emerged, and an ancient fossil fish-reptile ancestor of the emergent amphibians of 360,000,000 years ago.

The discoveries were made in fossil-rich areas of the Boomerang Range, above the Skelton Glacier, and in the Mount Fleming area of the Wright Dry Valley system. Both areas are about 150 miles west of Scott Base and McMurdo Sound.

The two geologists are Messrs. Michael Gorton and Barry Kohn, B.Sc. honours graduates who went south under the leadership of two former Victoria University graduates, Drs. P. N. Webb and B. C. McKelvey. They said that the leadership of the two geologists had enabled them to concentrate their work in worthwhile areas.

SKELTON GLACIER

They were carried into the Skelton Glacier by C-130 Hercules of the American Antarctic Support Force, and travelled by motor toboggan over an area of 1,000 square miles during three months south last summer.

Mr. Gorton said the finds of the extremely ancient glacial moraine deposits and sediments linking this Victoria Land section of Antarctica with the ancient single continent, Gondwanaland, was the most exciting of their several discoveries. Some 50 geologists had previously worked the Mount Fleming area, he said. None had come across the remains of the "Tillite" moraines in the ancient rock strata.

The "Tillite" ancient moraine, now rock, had been found in identical formation in South Africa, India, Australia, and South America. It had also been found much farther south in the Antarctic continent, in the region of the Beardmore Glacier.

LINK PROVED

"This find definitely links Victoria Land with the southern mountains of the Antarctic Continent," said Mr. Gorton. This had been theorised previously, but there had been no proof.

It meant that Victoria Land, with the Beardmore area, had once been part of the course of the ancient glacier which about 300,000,000 years ago had flowed across regions of what were now South Africa, India, Australia, and South America. Similar finds had been made in all these countries.

The likelihood of a link such as this in New Zealand was remote, said Mr. Gorton. There had been far too much activity in New Zealand's geological history. Movement had displaced, removed, or made unrecognisable any remnants of this ancient glacial flow which might perhaps have existed here.

PERFECT FOSSIL

The perfect fossil jawbone of the ancient Crossopterygian fish had

been made high in the Boomerang Range. "We were walking on fossils while we were working; we couldn't help it!" said Mr. Kohn.

The ancient fish was of an extremely high order of fish, the next step below the amphibian creatures which had been the first to walk on land. Among the sandstone sections of shell and animal remnants brought out from the area were "appendages" of hard bone. "We are not quite sure what they are, but we believe they were hard fins which these creatures used as feet," said Mr. Gorton.

The jawbone find had taken two hours of uncovering in a freezing wind, and had been photographed in a joint effort with Dr. Webb, said the finder, Mr. Gorton. The fish was of the same time period as the *Coelocanth*, and related types had been discovered elsewhere.

"It was too fragile to move. The big teeth were loose in the sockets, and we left it where it was for someone better equipped to handle," he said. From the photograph alone, specialist scientists could identify the fish, which as far as they were aware, had never been found before, he said.

LAND ANIMALS

It was thought to have lived in a great, warm, freshwater sea. "As it slowly dried up, and the waters receded these creatures had to evolve means of coping with the drier conditions," he said. The result was the first amphibians of the Devonian Age.

These had developed into the first land animals, and had been followed by the reptiles, from one section of which man had finally evolved from warm-blooded mammalian links.

ANTARCTIC FISH HAVE ANTI-FREEZE

A substance that acts as an anti-freeze agent has been detected in the blood of Antarctic fish. The fish inhabit the waters of McMurdo Sound, where the average temperature of the water is almost two degrees below zero.

One of the fish, belonging to the genus *Trematomus*, inhabits tunnels

in the loose layer of ice that forms below the solid ice sheet on the surface.

The other two species studied live in deep waters, often resting on the large masses of anchor ice on the sea bed.

Addition of salt to water lowers the freezing temperature, which is why blood serum, consisting mostly of a salt water mixture, freezes at a lower temperature than pure water.

Arthur DeVries and Donald Wohl-schlag, of California and Texas Universities, have found that the amount of salt in serum of the *Trematomus* species can only partly account for the low temperature, about minus two degrees Centigrade, at which the serum freezes.

Studying the protein residue in the serum, they isolated a substance that accounted for about a third of the lowering in the serum freezing point, despite the small amounts of it present.

The substance is clearly a powerful anti-freeze agent. Chemical tests indicate that the molecules of the substance are part protein and part sugar units.

Sugar units possess large numbers of the chemical groups, known as hydroxyl groups, which are an important feature of the anti-freeze agents used in car radiators.

MEN MISS MIDWINTER

Not all Australians serving in Antarctica were able to celebrate Midwinter in the comfort of base camp with their companions. Pat Moonie and Peter Gibson of Melbourne and Dr John Hogg of Sydney were out with two teams of huskies between Mawson and Fold Island undertaking fauna studies.

Ross Anderson, of Box Hill, Victoria, Syd Little of Hawthorne, Queensland, and Mike Riley of Yagoona, N.S.W. were on the Antarctic ice cap, south of Casey Station, deep-core drilling to study the internal structure and temperature of ice.

The remainder of the men at the station celebrated in the traditional fashion.

AUSTRALIAN ANTARCTIC NEWS

Operation "Deep Drill"

A seven-man party left Australia's new Antarctic station Casey by tractor train early in June to set up an ice drill and supply equipment at Cape Folger, about 12 miles north of the station.

The expedition will pave the way for nine months of field work by a two-man glaciological team consisting of Ross Anderson of Melbourne and Syd Little of Brisbane.

The two men will drill three holes in the ice to a target depth of 1,500 ft.

Radio operator Mike Riley of Sydney will spend the next five weeks with them to lend assistance and provide radio contact with Casey.

These drilling operations are a new phase in a continuing study by scientists of the Department of Supply's Antarctic Division.

Much of the research has taken place, over a number of years, at the Law dome near Casey. This dome, about 3,800 ft. high and 150 miles across, is a microcosm of the 14,000 ft.-high ice dome which covers 5.4 million square miles of the Antarctic continent.

By repeated determination of the size, shape and mass of the Law dome, Australian scientists have shown that it is subsiding.

A study of this dome will lead to a better understanding of the main dome, the stability of which is not yet known.

The new drilling operations will increase knowledge of the internal temperature and movement of ice masses, and the interdependence of those factors.

Studies of the ice cores, recovered from the holes, will give the history and age of the ice over thousands of years.

The two-man team will remain in the field almost continuously throughout 1969, at distances up to 70 miles from Casey. They will spend long periods at each drilling site.

Protein from Antarctic?

Australia could feed a third of the world's population from untapped resources of protein in Antarctic waters, an Indian biochemist, Dr. G. S. Sidhu, said at the Australian Biochemical Society conference in Adelaide on May 20.

He reported that with suitable technology, from 100 million to 500 million tons of krill—a small crustacean with a high protein food value—could be harvested annually. Dr. Sidhu, a senior research scientist with C.S.I.R.O.'s Division of Food Preservation, said that 70 million tons of krill a year was sufficient to provide a daily protein intake of 20 grammes for a population of 1,000 million people or a third of the world's population.

This was about four times the average daily protein intake in India and the equivalent of a steak dinner a day. Dr. Sidhu said C.S.I.R.O. had processed krill into an almost odourless powder which could supplement foods of less protein value.

He has been carrying out experiments at the C.S.I.R.O. with the help of the Mawson Institute for Antarctic Research at the University of Adelaide.

Dr. Sidhu said that Australian authorities knew that Russian and Japanese scientists were investigating methods of harvesting krill in Antarctic waters.

Krill—the staple food of whales—floated as a reddish-brown scum on Antarctic waters beyond 1,000 miles south of Tasmania.

The best method of harvesting would probably be similar to that of the whale which scooped it from the surface and filtered off the water.

His studies had shown that the shrimp-like plankton was of similar food content to casein or milk protein. It contained about 14 per cent protein and fatty acids. It did not have the disadvantage of fish protein which had very high fluoride concentration.

Dr. Sidhu said that krill was native to Antarctic waters, but a similar species of less food value was found in Arctic waters.

If Australia did not take advantage of the huge quantities building up as whale numbers fell, Russia and Japan would.

He believed that up to 500 million tons could be harvested annually, compared with the world's total fish harvest of 66 million tons.

Following on this statement by Dr. Sidhu, a question was asked in the Australian Parliament. In reply, the Minister of Works (Senator Wright) said that it was unlikely that the largest reserves of krill, existing naturally in the Antarctic, would become a practical and economic source of protein.

Senator Wright said that no trials had been made of the material for human diet, but there seemed to be no reason to expect that the material could not be processed.

However, its successful harvesting would be a major engineering feat and the economic aspect of its harvesting and processing had not yet been considered.

Australians May Build Polar Ship

The Department of Supply would consider having an Australian Antarctic relief vessel built to end Australia's reliance on chartered relief vessels, the Minister for Defence (Hon. Mr. Fairhall) said in Canberra on March 25.

He was replying in the House of Representatives to Mr. England, who said that the chartered relief ship, "Thala Dan," had had to call for aid this year from an American ice-breaker.

He asked who paid for the services and if Australia could build her own vessel, using it for fisheries research when it was not needed in the Antarctic.

Mr. Fairhall said that the aid had been given under the Antarctic Treaty. So far, the honours in such cases had been fairly equally divided between the treaty nations.

The treaty nations had agreed that no charge should be made for such help. The Department of Supply was currently considering the provision that should be made for the continuing Antarctic work and that consideration could well include the provision of Australia's own ships, he said.

It was true that the Antarctic summer was short and there could be some other uses for such a ship.

But such work could require considerable conversion and reconversion back for the Antarctic relief work, Mr. Fairhall said.

Antarctic Barge

De Havilland Marine recently completed a special 30 ft. all-aluminium barge designed for the Australian National Antarctic Research Expedition.

The aluminium hull has been chosen to withstand the Antarctic climate and the specifications demand that the boat must remain unpainted during its sojourn there.

This virtually eliminates any maintenance, which is a vital factor as the boat will only be used for five days during a year in the Antarctic.

During the year the barge will remain firmly anchored and must be able to withstand sub-zero temperatures and winds up to 150 m.p.h.

The barge's "active service" period of five days will be hectic to say the least—it has been specially constructed to ferry 15-ton vehicles and the huge accumulation of stores needed for the 1969 expedition.

The craft will save valuable and costly hours of countless small boat trips that would normally have to do the job—apart from the problem of getting the big track vehicles on shore.

The barge has a 30 ft. hull length by 16 ft. hull beam by 4 ft. hull depth.

The loading area of the barge is 12 ft. wide by 24 ft. long and is decked in special embossed non-skid aluminium plate.

Two 10 ft. long ramps are hinged at the bow, swinging 15 degrees down and 30 degrees up to provide access for loading and unloading.

NEW ZEALAND MAPS HAVE BEEN PRODUCED

The New Zealand Department of Lands and Survey have produced another four excellent maps in their provisional Antarctic series on a scale of 1 to 250,000. These have been printed by the N.Z. Government Printer. They show the ice-covered land in white, the glaciers in blue, and the ice-free land and the names in brown.

The maps are based on the efforts of both the United States and New Zealand personnel. The U.S. Geological Survey tellurometer traverse stations of 1961-62 and Electrotype traverse stations of 1962-63 have been adopted for overall control purposes, and in addition U.S. aerial photography has been used.

New Zealand control stations have been fixed by astro observations and triangulations adjusted to agree with one another and with the U.S. tellurometer traverse.

CAPE ADARE:

NZMS 166 Sheet SR 59-60, 13

This map takes in part of the Pennell Coast from Cape Adare as far as Cape Scott and the Dennistoun Glacier on the west and on the east the Borchgrevinck Coast as far south as the Possession Islands. On the west this map is adjoined by the Mirabito Range and on the south by the Cape Hallett maps.

MIRABITO RANGE:

NZMS 166 Sheet SR 57-58, 16

This map was compiled from the ground surveys of the New Zealand Geological Antarctic Expedition of 1963-64, with J. H. Miller and M. R. J. Ford as surveyors; and the Federated Mountain Clubs of New Zealand Tararua Antarctic Expedition 1962-63 with F. H. Pearson and G. Holdsworth as the surveyors. The Mirabito Range was named after John Mirabito, the highly respected meteorological officer of the early days of Operation Deep Freeze who was a good friend to the men of Scott Base. Five large glaciers and several mountain ranges feature in this map.

WELCOME MOUNTAIN:

NZMS 166 Sheet SS 55-57, 4

This map, spanning the Australian Antarctic Territory and the Ross Dependency boundaries, is the result of the efforts of the ground surveys of the New Zealand Geological and Survey Antarctic Expedition 1962-63 (Northern Party) by surveyor J. A. Tobin and the Victoria Land Traverse 1959-60. It was named by the Traverse Party under van der Hoevan because it was the first land exposure they had seen for 700 miles.

Only a few mountain features show up above the endless sweep of the polar plateau in this map.

FREYBERG MOUNTAINS:

NZMS 166 Sheet SS 58-60, 1

This map was compiled from the work of the same expeditions and surveys as in the case of the Mirabito Range map. Named after the New Zealand Second World War General, Lord Freyberg, these mountains are flanked, appropriately enough, by the Salamander Range, for Winston Churchill on one notable occasion referred to "Tiny" Freyberg as "that magnificent salamander." On the western flank the mountains have as neighbour the mighty Renick Glacier.

These maps are available from the Lands and Survey Map Sales, Government Buildings, Wellington, New Zealand, at a cost of NZ 50 cents each plus postage (in N.Z. 15 cents each).

AMERICAN ANTARCTIC NEWS

Cost Per Man in the Antarctic

What does it cost to keep a man in the Antarctic for a year? Everyone knows that it will be astronomical, but Neal Potter of Resources for the Future, Inc., of Washington D.C., has done a study of the amount necessary to maintain an American at some of their stations in the Antarctic. He took into account such factors as the cost of conducting field expeditions and aerial mapping as well as the general cost of operating the station, and these were divided by the average population of each station for the 1964-65 year.

The figures show the cost per man for a year to be:

McMurdo	\$23,000
Inland Stations	\$102,000
Palmer Station	\$83,000

The cost of air transportation to inland stations accounts for the tremendous difference between such stations and McMurdo, while the high cost for Palmer Station is brought about by the cost of ice-breaker service which amounted to \$300,000. If this charge were excluded, the average cost per man-year at Palmer Station would have been \$50,000.

Huge Tanker Becomes a Possibility

One of the problems associated with the American Antarctic programme has always been that of providing adequate stocks of fuel at McMurdo Sound to ensure that flying would not have to be drastically curtailed. In some years, if a tanker did not arrive there by mid-December, flying had to be cut down. Over the years

storage space has been increased, and there are now plans to have a new 1,250,000-gallon tank installed. Because of the heavy ice conditions this season, there was an 11-day delay of the arrival of the "Alatna" with the season's first load of fuel, but the Antarctic Development Squadron Six (VXE-6) was able to continue its operations without difficulty, and in fact was almost at its busiest.

As detailed elsewhere in this issue, the stocking of adequate supplies of fuels this last season became a nightmare race against time and ice conditions, but this, it is hoped, will not be necessary in the future.

In February the "Southwind" carried out a hydrographic survey of the harbour in Winter Quarters Bay, named by Captain Scott who based his expedition here on his first expedition, to ascertain whether or not there would be suitable water available in the harbour to allow the proposed giant T5 tanker to berth there. Indications are that such a vessel could use the harbour.

Plans for next season call for the introduction of a T5 tanker capable of taking in one voyage the six million gallons of petroleum products which previously took six trips by the "Alatna" and the "Endeavour." Since such a ship will make only one voyage a season, it can plan its voyage to the Antarctic to arrive at McMurdo in late January or early February when ice conditions are at their best.

American Assistance to Other Expeditions

The past season, with its very heavy ice conditions, has made the task of landing and taking off personnel and replenishing stores and supplies at the various Antarctic stations on

the edge of the continent a very arduous one.

In line with the usual practice in the Antarctic of giving help where required, the nations concerned have been able to come to the assistance of others, and in this field, as always, the Americans have been most generous in the past year.

Among the help they gave, the "Southwind" assisted the "Thala Dan" in establishing the Casey Station (as detailed in last issue of *Antarctic*); British and Norwegian scientific parties were placed in position in the field by VXE-6 aircraft; the Japanese traverse party from Showa Station to the South Pole received fuel during brief periods of rest at Plateau and South Pole Stations; and the Soviet Union's Vostok Station twice hosted parties that had flown from McMurdo Station in connection with United States scientific equipment operated at Vostok by the Russians.

Following the long-standing custom, United States and New Zealand personnel worked closely together in both support and scientific activities in the Ross Dependency area.

The Gondwanaland Theory

Once more the theory that there was at one time a tremendous Continent named Gondwanaland has been raised, this time by two American scientists, Walter Sproll and Dr. Robert Dietz of the U.S. Department of Commerce's Environmental Science Services Administration who have recently processed data gathered during a world-wide cruise by the American survey ship, "Oceano-grapher," in 1967.

The result of their investigations shows a "perfect fit" between the two continents of Australia and Antarctica, at present separated by approximately 2,000 miles of water. This fit takes place when the margins of the two continents are joined together at the 1,000 fathom level.

Ten years ago Dr. Dietz and H. H. Hess propounded a theory that the sea floor is gradually spreading out on either side of the underwater mountain ranges that divide the world's major oceans. Moving at about an inch a year, the sea floor eventually plunges back into the mantle from which it came, thus constituting a conveyor belt strong enough to move and break up continents. The mantle is the part of the earth's interior which rests between the molten central core and the crust.

Magnetic studies of the sea floor have since then confirmed the conveyor belt hypothesis and provided the essential piece that had hitherto been missing from the theory of continental drift, an idea put forward to explain the similarities of geology and species distribution on the opposite sides of several oceans, as well as the closeness with which, for example, the west coast of South America fits into the west coast of Africa.

Approximately 200 million years ago, it is almost certain that South America and Africa were part of a single land mass known as Gondwanaland. Although a glance at a map shows that the two continents fit together reasonably well, the fit is most exact if taken at the continental shelf level. Further, Australia and Antarctica are also thought to have joined together, the land mass they formed being part of the super-continent of Gondwanaland.

Another name given to this super-continent was Pangaea. Other authorities, including Sproll and Dietz, believe there were two continents in the area, referred to as Gondwana and Laurasia. Supporters of the two-continent theory believe Gondwana comprised Australia, Antarctica, Africa, Malagasy and various submerged fragments, while Laurasia consisted of North America and Eurasia.

Although there have been different opinions of the exact manner of their fitting, Sproll and Dietz said that their study showed that the

south coast of Australia once joined Antarctica and identified the exact position of the fit.

The south-eastern end of Australia, including Tasmania, fitted into the Ross Sea, and the south-western end of Australia reached to just off Antarctica's Knox Coast.

Between these two points the concave Great Australian Bight fitted snugly against the convex outline of Wilkes Coast.

"Recent geophysical finds on the ocean floor have demonstrated to the satisfaction of most earth scientists that the continents were once together," they said.

"About 100 to 150 million years ago they commenced to separate and slowly drifted to their present scattered locations around the globe.

"One of the last units to be sundered, the Australian-Antarctica split, may have occurred as late as 40 million years ago.

"But determining exactly how the pieces fitted together has remained unsolved, except for Africa and South America, which have rather obvious parallel outlines across the South Atlantic Ocean."

Dr. Dietz believes the pre-drift outlines of the continents are to be found halfway down the continental slopes at the 1,000-fathom contour line, where the total area of misfit including underlapping and overlapping is a minute portion of the whole, about 150,000 square kilometres.

A perfect fit would not be expected since the margins of the continent will have been changed by accretion and erosion during the 200 million years or so since they separated.

"Because the edges of continents are not like the clean vertical edges of an ordinary jigsaw puzzle, but instead are like badly slumped stream embankments, the problem of fitting them is rather complex," Sproll and Dr. Dietz explained.

The final position, as chosen by the computer, also aligns certain geological features found on the two continents.

New American Admiral Appointed

Rear Admiral David Fife Welch will relieve Rear Admiral J. Lloyd Abbot, Jr., as Commander, U.S. Naval Support Force, Antarctica, in a ceremony on June 19 at 11.30 a.m. at the Washington Navy Yard.

Rear Admiral Welch is currently serving as Commander, Amphibious Group FOUR at Little Creek, Virginia, a job he has held since January, 1968. Upon being relieved, Rear Admiral Abbot will assume command of Carrier Division SIXTEEN.

Admiral Abbot's tour with Operation DEEP FREEZE was marked by the first scheduled winter flights to Antarctica, the dedication of a permanent Palmer Station on the Antarctic Peninsula, progress toward all permanent construction at McMurdo Station, the acquisition of a fifth C-130 ski-equipped Hercules aircraft for Antarctic Development Squadron Six, and increased use of satellite technology.

Originally from Fort Wayne, Ind., Rear Admiral Welch has held nine commands prior to this assignment; four ships, Underwater Demolition Team ONE, Mine Squadron EIGHT, Destroyer Squadron TEN, Amphibious Training Command, Atlantic Fleet and Amphibian Group FOUR. He has held a number of staff assignments including a tour as Assistant Chief of Staff for Logistics for U.N. Naval Forces, Europe, and a year with the U.S. Military Assistance Command in Vietnam.

No stranger to Washington, he served in the Office of the Deputy Chief of Naval Operations (Fleet Operations and Readiness) from September, 1958, to September, 1961. In 1961 he received a Master of Arts degree in Education from George Washington University.

The Naval Support Force, Antarctica, nicknamed "Operation DEEP FREEZE," is the U.S. programme of logistic support for scientists carrying out surveys and experiments on the Atlantic continent. As its commander Rear Admiral Welch will

be responsible for maintaining the 12,000-mile lifeline from the United States to Antarctica, a job requiring the efforts of more than 2,000 men from the Navy, Coast Guard, Army, Air Force and Marine Corps. During the Antarctic summer, the task of feeding, transporting and supplying the American scientific programme in Antarctica is handled by the Support Force, composed of members of more than a dozen specialised units, under its deployment name, Task Force 43.

During the Antarctic winter season, the Admiral will reside in Washington. When the austral summer begins in October, he will move to advance headquarters at Christchurch.

Improved Working Conditions and Equipment

Over the period of a decade and a half since the "Atka" first made its preliminary study of Antarctic sea-coasts with a view to locating suitable American bases in connection with the American International Geophysical Year programme, great advances have been made in both techniques and equipment used in the far south.

At first, until the end of the IGY year 1957-58, it had been expected that American participation—and indeed other countries' participation in that region—would draw to an end, and that the various stations which had been set up would be closed and put in moth-balls for possible future use at a later date.

Therefore, the American stations which had been built had not the permanency about them which is now apparent. However, once the United States decided to continue its Antarctic programme indefinitely, it became apparent that the stations which had been hastily built would need very great reconstruction if they were to become permanently habitable by large bodies of scientists and support forces.

McMurdo Station, in many respects the most important American station, received attention in this respect in 1960 as regards better living and working facilities. The plan adopted at that time has had to be greatly modified over the years to take cognisance of the better methods and materials which have now become available. Particular progress has been made within the last season, including the completion of the service portions of McMurdo's central personnel building. One of the factors which have improved living conditions at this base has been the installation of the nuclear power plant and its water-distillation system. The availability of the reactor was slightly less last year than previously, but the total water production was up on earlier figures. Water in sufficient quantities has always been a problem at Antarctic stations, particularly as in the case of McMurdo where there is a large number of personnel, but the station now has sufficient for its basic needs. Work is being continued on improving water-distribution and sewage problems. Here again, new and improved techniques are proving invaluable.

Philatelic Mail from U.S. Bases and Ships

Philatelists may have covers post-marked at South Pole and Byrd Stations and aboard DEEP FREEZE ships which operate a post office during the 1969-70 Antarctic season.

Collectors are limited to one cover per person to be postmarked at Byrd Station, South Pole Station, and from each DEEP FREEZE ship operating a post office. (If a cancellation is desired from only one station, the word "Byrd" or "Pole" should be written in the lower left corner of the cover.)

Byrd and South Pole Station post-marks can be obtained by placing

two addressed covers bearing United States postage at the letter mail rate in an envelope and mailing them to:

DEEP FREEZE Philatelic Mail
U.S. Naval Construction
Battalion Center
Davisville, Rhode Island 02854.

International Reply Coupons may be used by collectors from foreign countries to defray postage on covers.

Philatelic mail to be postmarked at Byrd or South Pole Station must reach Davisville not later than September 1, 1969, in order to be processed during the DEEP FREEZE '70 Antarctic winter. The postmarked covers should be received by the collector between October, 1970, and March, 1971.

Cancellations can be obtained from the following ships participating in DEEP FREEZE '70:

Ship's Name and Address	Cutoff Dates for Covers
USCGC "Burton Island" (WAGB-283) P.O. Box 20820 Long Beach, Calif. 90801	Nov. 19, 1969
USCGC "Glacier" (WAGB-4) P.O. Box 20900 Long Beach, Calif. 90801	Nov. 19, 1969
USCGC "Edisto" (WAGB-284) Boston, Mass. 02109	Nov. 12, 1969

Covers postmarked aboard DEEP FREEZE ships will be returned to collectors during the operating season as expeditiously as postal backlogs permit.

Philatelic mail will be returned unprocessed when more than the authorized number of covers is submitted, if it appears that a commercial motive is involved, if covers are received after the cutoff dates established above, or when covers are submitted to DEEP FREEZE ships or units which do not operate a post office.

Five American Women To Go To McMurdo

For the first time, the United States Antarctic research programme team will include five women scientists, according to a National Science Foundation news release.

The two scientific parties containing the women will both operate within helicopter range of McMurdo Station.

Dr. Lois Jones of the Ohio State University's Institute of Polar Studies and three field assistants will carry out field research in the wind-swept ice-free valleys about 70 miles west of McMurdo Station.

Dr. Jones will be assisted by Mrs. Eileen McSaveney of the University department of geology, Mrs. M. Lindsay, of the Institute of Polar Studies, and an additional woman scientist yet to be named.

The fifth woman scientist is Mrs. Christine Muller-Schwarze, of Utah State University, who will carry out animal behaviour studies at the large penguin rookery at Cape Crozier on Ross Island.

Dr. Jones's group will spend about ten days at various sites, using tent camps. They will return to McMurdo Station for about five days of laboratory work between each move to a camp site.

Dr. Muller-Schwarze with two other scientists and his wife, will work from a Jamesway hut built near the Cape Crozier rookery, which contains nearly 500,000 penguins.

This group will study the responses of Adelle penguins to aerial, aquatic and ground predators under natural and experimental conditions.

The women scientists will arrive in the Antarctic late in October. The five women will be among a total of about 150 American scientists who will make the 10,000-mile journey to Antarctica to carry out research during the next summer season.

RACE AGAINST TIME

There was a very close race against time this past season to ensure that there was an adequate supply of petroleum products at McMurdo

Station to cover not only the winter period but the early part of the flying season as well.

The "Alatna" made her third voyage for the season to McMurdo and, as usual, wasted no time in putting her cargo ashore, and 28 hours after arrival on February 16 she left again for Lyttelton.

The "Burton Island" has assisted the vessel on this trip, and was again on hand to render a similar service when the "Alatna" made her final voyage. Both ships reached McMurdo Sound on March 7, and a busy 24-hour round-the-clock shuttle saw the last of the cargo ashore. Both ships left next day, and as they proceeded up McMurdo Sound it was observed that the ice was quickly thickening—Winter Quarters Bay had completely frozen over with about 18 inches of ice, and at Hut Point there was 20 inches. Off Beaufort Island the ice concentration was such that "Burton Island," with five engines on the line, was slowed to between three and four knots. It was by a very narrow margin that "Alatna" had won her race to replenish McMurdo's fuel stocks.

Earlier the "Alatna" had suffered ice damage to her propellers, the repair of which, although the damage was not serious, delayed her tight schedule and led to the haste with which she had to operate.

AMERICANS CELEBRATE MID-WINTER

The ceremonial burning of the Southern Cross, a table cloth on the dinner table, and a costume party. These were some of the events Operation Deep Freeze men in Antarctica staged to mark the mid-winter's day.

The Cross-burning ceremony was held at Pole Station where nine men invited other Deep Freeze men to their party—and received no replies.

The temperature for June 20 at this base was minus 55 degrees F, although earlier in the winter it had reached minus 98 degrees.

At McMurdo Station, where more than 200 men were wintering over, a carnival had been arranged, and the movie "War and Peace" was screened. It was only minus 26 degrees at this station.

At Byrd Station, twenty men sat down to a special dinner—with a crisp table cloth over the usually bare table. Afterwards there was a costume party and a beard-judging contest.

The eight men at the coastal Palmer Station celebrated with a buffet dinner.

ICE HAMPERS WEDDELL SEA WORK

The heavy ice conditions which were such a feature of the 1968-69 summer season in the Antarctic had a particularly bad effect on the work of the International Weddell Sea Oceanographic Expedition. It had been planned that the "Glacier," after breaking a channel into McMurdo Sound, was to sail for Valparaiso, Chile, and then proceed to the Weddell Sea where she was scheduled to appear in the first week in January. However, it was January 18 before she could depart from McMurdo, and only reached the Weddell Sea a month later. This, naturally led to a drastic reduction in the overall scientific programme. Further setbacks were experienced when it was found that the Weddell Sea was so heavily iced that it was impossible for the "Glacier" to penetrate far enough into the ice pack to recover three current-meter buoys set out the previous year. Considering the lack of time at their disposal, the scientists on the "Glacier" did a commendable amount of oceanographic work.

U.S. SQUADRON CHANGES ITS NAME

The American airmen who give such splendid service in the Antarctic have had the name of their squadron changed.

On January 1, 1969, its name was changed from Air Development Squadron Six (VX-6) to Antarctic Development Squadron Six (VXE-6). While the squadron thus has a different designation, it still, of course, retains the experience and skill for which it has been noted and for which it has earned high praise. For the third successive season the squadron had an accident-free record. An accident-free record was also achieved for the season by the U.S. Army Aviation Detachment (Antarctica Support), which provided field support for the Ellsworth Land Survey. When the season ended this Army unit was disbanded, and its helicopters were turned over to the Navy, thus bringing to an end a distinguished contribution to Antarctic history. VXE-6 pilots will fly the machines in Deep Freeze 70.

REAR-ADMIRAL ABBOT RETURNS TO U.S.A.

Admiral J. Lloyd Abbot, who will be relieved as commander of Operation Deep Freeze next July or August by Rear-Admiral D. F. Welch, said in Christchurch before his departure, that one of the most outstanding achievements during his command was the airborne operation whereby films showed the contours of rocks beneath Antarctica's surface.

Work by the Scott Polar Research Institute, Cambridge, and Operation Deep Freeze aircraft had enabled this information to be provided at a much speedier rate compared with the dynamiting of regions.

Another important feature was the deep drilling at Byrd Station, although this season had been a frustrating one when trying to bring up rock.

Admiral Abbot, who has made twenty trips to McMurdo, and about as many to the South Pole, said he "hopes and wants to be appointed commander of a carrier division."

"Mrs Abbot and I will leave a big part of our hearts in New Zealand. Somehow, maybe when I retire, we will come back."

VERSATILE ITALIAN EXPLORER

The Italian alpinist and assistant in the follow-up search for fossil remains of freshwater fish in the Antarctic is a versatile man who is again in the news—this time in a vastly different venture.

He has featured in this journal frequently of late, having climbed several Antarctic peaks, including Mount Erebus. Now he has been appointed as chief photographer of the Thor Heyerdahl expedition on the "Ra," the first papyrus vessel to sail the ocean for thousands of years. Carlo Mauri is the Italian representative of the seven-nation crew which left the Moroccan port of Safi on May 25 to test the theory that Egyptians could have crossed the Atlantic to Central America 5,000 years ago.

BLACK ICEBERGS

An article in a late issue of the South African "Antarktische Bulletin" draws attention to the problems associated with black icebergs, which have been recorded from time to time since Captain James Cook first sailed into the Antarctic in 1773, until sightings made in 1967. It is possible that some of the sightings which have been made of what later proved to be non-existent islands have been in reality black icebergs. One of the dangers of such icebergs, of course, is that if they are met at night they are invisible.

One theory is that these icebergs originate around the islands of the South Shetlands which are active volcanoes, and the blackness is caused from the volcanic ash which becomes embedded in the slow-moving glacier which ultimately become icebergs.

Has any reader anything to add on this strange phenomena of black icebergs?

BRITISH ANTARCTIC SURVEY NEWS

Deception Island Eruption

Royal Society vulcanologists returned to Deception Island on March 4 to carry out further observations and to continue mapping the February, 1969, ash deposits. They found that fourteen new eruptive centres had appeared and that a number of fissures up to a mile long had opened on the inner slopes of the caldera between Mount Pond and Pendulum Cove, at a height of about 400 ft. Bombs up to 13 ft. in diameter had been ejected, and a deluge of mud, water and ice had flowed down along the entire length of the fissure, completely destroying the Chilean base at Pendulum Cove and partially burying the British base in Whalers Bay. The "John Biscoe" stood by while the party was ashore and was able to salvage equipment from the British base. The ship left Deception on March 23.

Single-Engined Otter Crash

While carrying out a depot-checking flight on March 3, the Survey's single-engined Otter aircraft was forced down by engine failure, in a heavily crevassed area 30 miles north-east of the Stonington Island base. The plane had to be abandoned as the undercarriage was smashed. Fortunately, none of the five men on board were injured and they were picked up and taken back to base by the twin-engined Otter on the same day.

The twin-Otter had had a successful first season in the Antarctic in spite of an inauspicious beginning (a forced landing on the Larsen ice shelf shortly after arrival; see March 1969 issue). As the February eruption had closed the Deception air facility, the aircraft was flown direct from Palmer Station to Punta Arenas

and then back to De Havilland's in Canada at the end of March for overhaul and wintering.

Reoccupation of Fossil Bluff and Horseshoe Island

The Survey's advance base at Fossil Bluff will be occupied again this winter, this time by two glaciologists and two geologists. A four-man geological-geophysical party will also winter at Horseshoe Island in northern Marguerite Bay. Horseshoe Island was closed down when the Stonington Island base was reopened in 1960, and since then has been occupied only intermittently.

R.R.S. "Shackleton's" Last Antarctic Voyage

As an economy measure, the "Shackleton" will not sail south next season. She was built in Sweden in 1954, purchased by the Survey in 1955, and made her first Antarctic voyage that year. The vessel will probably be converted and used by the Research Vessels Unit of the Natural Environment Research Council for oceanographic work. The new B.A.S. vessel (see December 1968 issue) will not be ready for service until 1970, so only two ships will be in use next season—R.R.S. "John Biscoe" and M.V. "Perla Dan."

New Stamps

Four commemorative stamps marking the 25th anniversary of continuous scientific work were issued on February 6, the date on which the British base on Deception Island was established in 1944. This issue was on sale until May 5.

NEWS FROM SOUTH AFRICA

The return of SANAE 9 on board the M.V. "RSA" was marred by the sudden and unexpected death of Mr. M. J. Coetsee, Head of the Antarctic Division of this Department, on March 9, 1969. Mr. Coetsee went to Cape Town to meet the returning expedition and to make arrangements for the visit by the "Fuji" which was expected a week later. Mr. C. J. J. van Rensburg, who visited SANAE during January and February to investigate transport facilities, has since taken over as Head of the Antarctic Division.

One of the highlights of the year was the erection of the Borga Base approximately 30 kilometres from SANAE. Huldreslottet was reached on May 5. Camp was pitched on the western side of the mountain and it was decided to erect the Parcoll hut on an apparently sheltered slope on the northern side of the mountain. A site on which to erect the hut was levelled and since the weather remained perfect it was decided to go ahead with the erection of the hut by the light of Muskeg headlamps and Tilley lamps. Work was still in progress when a storm blew up and kept the staff indoors for four days. Fortunately the incomplected hut withstood the weight of the snow and the completion of arrangements and the hut could be finalised. This is the first time that South Africa has accomplished the establishment of a permanently staffed base so distant from the main base. Borga Base will enable the geologists to cover a far greater area and do more intensive research work. Messrs. Aucamp, Wolmarans, Hodson and Muir will remain at the base until January, 1970.

A teleprinter service was installed between SANAE and Pretoria with effect from April 1, 1969, and was a

great improvement on the old morse code communication system that has been in use since 1962. The teleprinter has also speeded up the communication traffic advantageously. History was made by Chris Muir, Radio Operator of the Borga Base, when he succeeded in directly contacting Derdepoort, Pretoria, from the Borga Base. This was really an achievement as he was working from the cab of a Muskeg tractor under extreme weather conditions and with the aid of a Primus stove to keep the radio warm in order for it to function properly.

The film on Marion Island "Forty-Seven Degrees South," has been completed by the National Film Board and is proving a great success. We sincerely hope that it will help to fire the interest of ambitious young men to accompany expeditions to the island. The film on South African activities has almost been completed. This film is for world-wide distribution.

Selection for SANAE 11 is in full swing, in fact, the physicists have already started their training. We hope to send a well-equipped team to SANAE by the end of the year.

It has been finally been decided to extend the erection of a new base to the beginning of 1971. Planning of the new base is nearing completion. The basic outlay will not differ much from the existing base.

Mid-winter was commemorated with the usual flare. The expedition members are already looking forward to their relief next year. However, much has still to be done until then.

During August and September the "RSA" will be used as a meteorological ship for the first time. During this period she will also visit Gough Island for the erection of a new radio theodolite.

BELGIAN ANTARCTIC EXPEDITION

The Belgian Antarctic Expedition of the summer of 1969 was organised in collaboration with the South African Antarctic Expedition who assured sea transport from Capetown for eight members of the Belgian team (two glaciologists, two electronic scientists, two pilots and two mechanics) and their supplies. In addition, they transported two aircraft, an Otter DHC3 and a Cessna 180B. The Belgian team provided the South Africans with logistic support.

SCIENTIFIC PROGRAMME

The Belgian scientific programme was entirely centred on aerial measurement of ice thickness using a radio echo-sounder Randall (S.P.R.I. II).

The team set about measuring a long profile from its base at SANAE to Sor-Rondane, the mountainous zone explored during the Belgian Antarctic Expedition (1959-61) and the Belgian/Netherlands Expeditions (1964-7). In this latter zone the profiles of ice thickness had already been measured by gravimetric method and the speeds of the ice movement stabilised by resection/triangulation. The verification of these measurements by this new direct method was thus of particular interest.

THE RADIO ECHO-SOUNDER

The principle of a radio echo-sounder is the same as that of the radar detector. The apparatus consists of a transmitter and a receiver. The latter is coupled to two oscilloscopes permitting the measurement of the interval between the sent and the reflected signal.

The apparatus used by the Belgians had been developed at the Scott Polar Research Institute, Cambridge, U.K., and made by the firm of Randall Electronics in Kempton, U.K. The transmitter emits at 35 Mc every 65 μ s seconds at a power of 500 watts. During transmission the receiver is suppressed. It amplifies the reflected signals and is recorded by two oscilloscopes (Tektronix

type), one showing the modulation of amplitude (x, y), the other showing the modulations (z) or the intensity. A 35 mm Slackman camera registers continuously the entothodic image on the latter oscilloscope. The film is unrolled in continuous fashion behind the 'objective' which stays continuously in view. The speed of the camera can be changed to allow adaptation to the horizontal scale (or the distance travelled over) to the speed which varies with the time intervals between the reflected signals or the configuration of the glacier ice.

A "time-mark" is registered every minute. The operator controls, continuously, the signal on the other oscilloscope and regulates the receiver's attenuation on to an optimal reception. As a reflecting surface can be characterised by a signal more or less strong, the attenuation change in decibels is recorded, which permits, for example, easy distinction between a reflection from water or from rock.

Transmitter and receiver are served by the same dipole antenna fixed under the aircraft.

The echo-sounder had been placed on board the Otter aircraft at Cambridge with the help of Dr. Evans of the Scott Polar Research Institute, who was responsible for the recent development of this instrument.

CHRONICLE OF THE 1969 CAMPAIGN

Embarking at Capetown on the polar vessel "RSA" on January 7, 1969, the expedition reached the

South African base, SANAE, on Jan-21. Strong contrary winds slowed down the passage on the first part of the journey. On the other hand, the pack ice was not very extensive, and navigation as far as the coast could be made in practically ice-free water. For the first time they had available information on the state of the ice pack and advice on routes and navigation communicated telegraphically by Dr. C. Swithinbank (Scott Polar Research Institute) who analysed photos transmitted by the American satellite.

During the sea transport of the Otter the tail-plane was damaged, the aircraft having become detached from its two supports. Repairs had to be made on board ship.

All the ice in the bay having disappeared, the unloading of aircraft and material, as with the later re-loading, had to take place directly on to the shelf. These operations, in spite of all hazards, were accomplished safely.

The Belgian team was soon installed under canvas near the South Africans at SANAE base.

The first days of the mission were devoted to air transport of South African parties. In 20 flying hours the Otter transported the material necessary for the erection of an advance base, 400 kms (250 miles) to the south in the Borgafjellet Massif.

During this time the echo-sounder of the flight recorder was installed and tested respectively on board a vehicle and the aircraft. The technique of developing the films under canvas was attempted at the same time.

After finalising the transport flights, the echo-sounder was mounted, and used with success for a first flight in the Otter above the ice-shelf. Unfortunately after this flight the spindle in the starter-motor broke. A careful examination was made by the mechanics, who discovered that the breakdown could not be repaired in the Antarctic.

After consultation with the President of the Belgian Antarctic Committee, they decided to continue the

campaign doing reduced survey work using the Cessna aircraft around SANAE as well as in following the caterpillar vehicles. Fortunately, Mr. H. Fulton, leader of the South African Expedition, had kept two of these vehicles on standby at SANAE. The security of personnel was thus assured. Equally there had been envisaged a collaboration with the Soviet geologist, Soloviev, to do an aerial survey in the region. Lately he expressed his regrets at not being able to accept the offer because of the slightly unfavourable mechanical condition of his own aircraft.

The attempt at fixing the echo-sounder in the Cessna was quite favourable, and two operators were able to take their place on the aircraft.

The apparatus was powered by a small portable battery giving nevertheless the possibility of working for an hour. The other disadvantages included the loss of 15 decibels in the receiving signal, an absence of precise navigation instruments, and the impossibility of carrying a third (glaciological) operator. Although the essential programme had to be done in small local flights on the ice-shelf, characterised by a strong reflection from the lower water-ice surface, these inconveniences did not compromise the results.

However, the navigation on an ice-shelf without points of reference and with the reduced instrumentation of the Cessna, posed problems of which the solution will be found later.

From February 5 to 24 the Cessna surveys continued uninterrupted only by the usual few days of bad weather. These days were made use of in quickly analysing the profiles already measured and deciding on the plan of surveying. The coast was photographed and some navigational flights were made. During one of these flights they verified the break-out and disappearance of the greater part of Trolltunga, a peninsula of ice with an area of some 10,000 square kms (3,700 square miles).

On February 18, 1969, the Otter was loaded on board the "RSA" in Tottanbukta, the conditions of the cliffs in the embarking bay (Otterbukta) making difficult local loading. On February 25 the Cessna and the rest of the material was loaded.

The return voyage was a quick and pleasant one, and Capetown was reached on March 8.

The aircraft and material was sent on to Belgium by sea, while the personnel returned to Brussels by a regular airline flight.

The Belgians recorded their grateful appreciation of the excellent help received from the South African Expedition, and in particular for the splendid co-operation of H. Fulton, the leader.

SURVEYS IN THE REGION OF SANAE

1. Navigation:

The most serious problem encountered was the precise localisation of flights. At the beginning they had at their disposal a 1/250,000 map by Captain Menish of the "RSA" in 1962, based on radar images. This map was quickly revealed as not being precise enough for their purpose. In the coastal region they had only some adjustments permitting a sure identification. The winds in air streams at varying altitudes were evidently not known. Nor was there a meteorological map allowing for correct altitude to be indicated on the altimeter. Moreover, the Cessna's compass was of little value in showing absolute values.

An apparently satisfactory solution was found by basing the navigation on three base lines of which the extremities were landmarks and which at least two were visible while in flight. The azimuth of these lines had been determined and the distance between them measured by tellurometer by Mr E. Bosmans of SANAE 9. These base lines served as references; during each flight they were flown over at the altitude of from 3,000 to 4,000 feet in the appropriate direction. The distance being known, the chronological time between the two passages over the markers allowed calculation of

ground speed. This system of navigation did not give satisfactory results for the long profile measured towards the south (Krylen) because of different topographical and meteorological conditions.

For the other part, some navigation flights made according to the same principles permitted fixing of important coastal points at least with the same precision as that effected by the flights. Also the captain of the "RSA" established a new map, by radar of the coast and also by some bathymetric soundings by echo-sounder. The rise in altitude of the zone studied will surely remain a weak point in establishing a true image of the shelf.

2. Results and Interpretations:

Altogether thirty flights totalling 1,500 km (940 miles) of ice thickness profiles have been made. All the recordings were developed on the spot: their quality was very good.

The flights covered in detailed fashion a region of 6,000 square kms (2,400 miles) which included some ice rises in the western part.

3. Analysis of Calculation:

The reading of the films was made by enlargement or by microscope.

A reading was made every three seconds of recording which gave 20 readings corresponding to a distance varying between 2 and 2.5 km (1.25 to 1.5 miles) behind the speed of flight.

The time intervals thus measured were then converted to metres based on the speed of propagation found for the region. The profiles of thicknesses were then drawn (horizontal scale: 1/50,000, vertical scale 1/5,000). For these first profiles the thicknesses were all marked starting from the same reference altitude, thereby not taking account of the actual altitude of the terrain. It is proposed to reproduce these profiles on a series of composite maps and to publish them as a data report of the expedition.

The second part of the interpretation comprises the tracing of thicknesses as a function of these terrain

altitudes and an interpretation of the assembled data. It is proposed to publish these data in a specialised review.

These few drawn profiles already allow the hope that at the end of the work they will be able to obtain quite a precise idea of the morphology of the ice-shelf.

END OF A FAMOUS GAZETTE

There would be few journals associated with the Antarctic which can boast a life of 57 years. It is with great regret, therefore, that we learn that the November-December 1968 issue of the "Norsk Hvalfangst-Tidende" is to be its last. The Norwegian Whaling Gazette is the Organ for the International Association of Whaling Companies, and has always had a reputation for informative and well-written articles dealing with all aspects of whales and whaling.

The first issue of "Norsk Hvalfangst-Tidende"—Journal for the Whaling, Guano and Herring-Oil Industries—as it was then, was published in November, 1912, the editor being A. J. Dahl. In June, 1914, Mr. Sigurd Risting, who had been headmaster of the local district high school, joined the editorial staff. Dahl retired in 1921, and as from April, 1922, the journal was published at Sandjeford, the well-known Norwegian whaling centre, under the editorship of Sigurd Risting.

In the beginning, and for several years subsequently, the gazette was privately owned, its establishment being closely connected with the foundation of Den Norske Hvalfangstforening (The Norwegian Whaling Association). This connection became even closer with Risting's appointment to the editorship, as he was also the secretary of that Association. Risting died in 1935, and his successor, both as secretary to the Whaling organisations and as editor of the journal, was Harald B. Paulsen. When Paulsen died in 1951 Einar Vangstein took over both

jobs, and has continued in these positions until this final issue.

All members of the International Association of Whaling Companies and of The Federation of the Norwegian Whaling Companies have now ceased whaling, and it was felt that there was no longer the necessary basis for continuing the publication of Norsk Hvalfangst-Tidende.

The final issue of 64 pages is larger than usual but of the uniformly high standard which has been a feature of this excellent publication. It is with sorrow that we notify the passing of this long link with the history of whaling not only in the Antarctic but throughout the world.

ANTARCTIC TOURS FROM SOUTH AMERICA

Lars-Eric Linblad, president of Lindblad Travel Inc., is again moving into the Antarctic travel field this coming year, this time in a ship which he is having built in Finland. The vessel, to be known as the "Lindblad Explorer," will be 2,300 tons gross, 250 feet long, and have 50 air-conditioned cabins—all with private shower and toilet, and most will be twin-bedded cabins, save for a few singles.

There will be three naturalist cruises to the Antarctic, each of 12 days, but the first two also include a four-day visit to the Falkland Islands. The first cruise will commence at Montevideo, Uruguay, and the other two will commence and terminate at Punta Arenas, Chile. Passengers will, it is expected, be able to call at the polar stations maintained by the United States, Great Britain, Chile, Argentina and the Soviet Union.

When the third cruise ends at Punta Arenas on February 27, 1970, it will leave next day for a "Sub-Antarctic Islands" cruise, heading for Cape Town, with stops at the Falkland Islands, South Georgia, Gough Island and Tristan da Cunha.

The commencing fare for each of these cruises is \$2,200 for the Antarctic voyages and \$2,000 for the Sub-Antarctic Cruise.

GLACIOLOGICAL WORK AT VANDA

By A. J. HEINE

With the occupation of the new Vanda Station in the Wright Valley, a number of new glaciological projects have been started. During the 1968-69 summer preliminary mapping of the immediate Vanda Station area and the eastern third of Lake Vanda was undertaken by C. Hughes and A. Ayres.

The larger map included Lake Vanda Station) and that part of the Bull (a small lake to the east of Onyx River between it and Lake



(Photo: C. Hughes)

ONYX RIVER.

Vanda. A further detailed survey was made of this part of the Onyx, in preparation for the installation of water-flow measuring equipment during the 1969-70 summer.

Permanent bench marks were established around Lake Vanda, so that regular measurements of the water level can be made. The Onyx River began to flow into Lake Vanda on December 19, 1968, and stopped on February 8, 1969. During this period the lake water level rose approximately 8 inches.

Mr. S. Cutfield (wintering-over scientist at Vanda Station) was able to measure some river flows, and these were between 10-26 cusecs. In actual fact, the Onyx River, at its peak flow, was not easy to cross; at some points near Vanda Station, and the surveyors (Hughes and Ayres) were obliged to use considerable care at times.

Early in the summer, Heine, Hughes and Ayres visited the Asgard Range area immediately south of Vanda Station. They travelled up a small "dry valley" east of the Mt. Odin-Obelisk Peak Range, and looked down on to the Taylor Valley country in the vicinity of the Kukri Hills. The purpose of this reconnaissance was to investigate the glaciers in this part of the Asgard Range, with a view to establishing a project here during the 1969-70 summer.

This has now been approved by the Ross Dependency Research Committee and will supplement the glaciological work done further east by Dr. C. Bull of the Institute of Polar Studies. The New Zealanders will survey two unnamed glaciers this coming season, carrying out measurements of snow accumulation and ablation, and movement of the glacier. A "budget" of each glacier showing either an advance or retreat can then be calculated.

Several weeks were spent on the McMurdo Ice Shelf but unfortunately bad weather disrupted the work and this has now been postponed until next summer.

DEATH OF DR. MERTZ EXPLAINED

Two South Australian scientists believe that they have solved the 56-year-old medical mystery which brought tragedy to the late Sir Douglas Mawson's Antarctic Expedition in 1913.

They believe the cause of the "Antarctic Illness" which claimed the life of one of Mawson's companions and weakened the Australian explorer himself to the limits of his endurance was vitamin A poisoning caused by eating the liver of polar sled dogs, their only food when supplies were lost.

But for Mawson's six-foot stature and heavy build he might have died like his smaller companion, Dr Xavier Mertz, who died on January 7, 1913, suffering from dysentery, vomiting, fits and peeling skin.

This is the theory put forward by Professor Emeritis, Sir John Cleland and Dr R. V. Southcott, both of Adelaide, in the latest issue of the "Medical Journal of Australia."

Their detailed study says that there is no other adequate explanation for the illnesses.

Most of Mawson's stores were lost in an accident on December 14, 1912, when a third companion fell into a crevasse and was killed.

To survive, Mawson and Mertz began killing the dogs for dogmeat stew to supplement what food they had left.

Dr Southcott says that poisoning from polar bear livers and the livers of seals, wolf and other polar animals is traditional knowledge to the Eskimos, and only in the past 25 years has it been appreciated scientifically that their high vitamin A content causes poisoning.

Dr Southcott and Sir John Cleland found the clue when they studied the poisoning of four men who were admitted to the Royal Adelaide Hospital separately in 1935, suffering from what was thought to be arsenical poisoning.

The victims suffered headache, vomiting, pains and symptoms relating to the central nervous system. Their skin was also peeling.

Scrutiny of their records revealed that all had eaten seal's livers before being admitted to hospital.

NEWS OF THE SUB-ANTARCTIC ISLANDS

CAMPBELL ISLAND

(NEW ZEALAND)

Mr. Brian Smith, the Officer in Charge at Campbell Island, has forwarded the following article by radio telephone:

"This is a very different period on which to report news in comparison with the last two, full as they were of people coming and going along with a number of visits from ships.

The first day of March gave us the final visit of H.M.N.Z.S. 'Endeavour' together with a dose of Campbell Island weather to remind the navy that their earlier visits were the exception and not the rule. Eighty-four knots at the harbour entrance and 50 plus while at anchor; however, loading of both Antipodes Expeditions and Balloon project gear went smoothly despite the rather damp conditions.

This was a 'Big' day for the island population census with 13 men departing and two returning. We bade farewell to both of the parties which had been with us for a short but enjoyable spell and welcomed back Barney Maguire and Mike Bell who had returned to us after overhaul via Scott Base. Needless to say many and varied were the tales that these two produced in the days to follow and we very much enjoyed the hundreds of slides that they had taken on the 'holiday.' A strange feeling persisted for quite some time after the sudden reduction in population; many times a day we would gaze about a room and realise that this little handful of men was the lot—one always had the feeling that the others were about to come through the

open doorway but we soon settled down and began to enjoy the peace and quiet.

Most of the month was spent on getting as many of the outside jobs out of the way as possible before the onset of winter, and in this we were largely successful. A Barbecue down on the wharf celebrated the passing of our half-way mark as evident the next morning where aquatic growth appeared to have spawned a large number of Leopard cans.

April was another month that passed very quickly with a lot achieved. Painting dominated the programme; the wharf area is slowly taking on a new appearance with the colour scheme of white with green facings and roofs. May also was a statistically poor month for weather; sunshine gave us 6.5 hours, compared with the monthly average of 21 hours, and rainfall, days of snow, hail, etc., were above average. However, we have plodded along and still managed to achieve a good deal and keep everyone occupied.

A party at the end of the month celebrated two-thirds of the year gone. It seems to us as though we are almost home, which of course we are not, but the thought keeps us going and many times in a week talk gets around to what type of car to buy.

The last few days have brought the chill of winter with them. For three or four days we had fairly deep snow lying down to sea level with Saturday the 3rd giving the heaviest fall, low temperatures, and consequent freeze-up of water pipes. Nevertheless it was a welcome break from winter routines and allowed such escapades as building snowmen, snowball riots and the ever-popular photography.

We were very disappointed to learn that due to economic cut back in the 'States,' the 'Eltanin' would not be visiting us this winter, but this was later offset by the news that the RNZAF had agreed to supply us with an air drop.

We are therefore in a cheerfully optimistic frame of mind, looking forward to the air drop and mid-winter day festivities, with the confidence that the last three months will fly by."

Supply Drop To Campbell Island

The New Zealand Royal Air Force made a supply drop at Campbell Island on Saturday, June 21, by a Bristol supply freighter. The plane flew up Perseverance Harbour at 1 p.m. with 2,544 lbs. of food, coal and mail.

The nine men on the island must have been a little apprehensive of the skill of the RNZAF, because they had their dinghy already in the water and lying 20 yards offshore—just in case. However, all 17 parcels were dropped by parachute into the required zone in 40 minutes, and Squadron Leader P. G. Bevan commended the navigator, Flying Officer B. Francis, who lay in the nose window directing the drop by intercom. The pilot's main worry—icing up—did not occur and the Bristol arrived back at Invercargill Airport at 5 p.m.

Pageos Tracking Station On Heard Island

The "Southwind," in March, carried out a mission to assist the U.S. Army Topographic Command, when she visited Heard Island to install a PAGEOS tracking station. Between March 11 and 17, she successfully carried out this assignment and then sailed for home by way of Mauritius

Island and African ports. By the time she returned to the United States she had circumnavigated the globe.

The satellite-geodesy programme on Heard Island had originally been planned by the Army Map Service which, on January 15, was integrated into the newly-formed U.S. Army Topographic Command.

Hallett Station Serviced By "Burton Island"

On February 11 "Burton Island" visited Hallett Station and delivered mail and supplies, and then, after having been to McMurdo Sound, returned again to Hallett to evacuate men and material and to close the station for the season.

Ice-Probe Planned

One of the big events for the Scott Polar Research Institute in the future will be the radio echo flights planned by them in cooperation with the U.S. National Science Foundation for the 1969-70 and 1970-71 summer season. These flights will carry South Polar Research Institute radio echo sounders to probe the thickness of the Antarctic ice-sheet. During the 1969-70 season some 150,000 miles will be flown covering the whole continent with the exception of the Antarctic Peninsula (which the British Antarctic Survey will deal with) and parts of Dronning Maud Land and Australian Antarctic Territory to be covered by the Australians and Russians.

Measurements will be taken from an average height of 1,000 ft. above the ice-sheets. Flights will commence and end at McMurdo. The direction of the programme will be by Gordon Robin, while the Americans will supply the aircraft and crew and there will be American scientists cooperating with the British team.

Lake Vanda Meteorological Programme

by DON THOMPSON

A radiotelephone link has now been established with Lake Vanda, and monthly discussions on technical and other matters are now conducted between the Weather Office and Meteorological Observer Ron Craig.

The meteorological programme continues to run smoothly. Temperatures have averaged 8.9°F colder than Scott Base, with the lowest temperature for May being -56°F. Ron Craig remarks that the tempera-

ture from day to day is very variable, and on several occasions a temperature rise of over 25°F in 30 minutes has been recorded after the onset of a westerly wind.



(Photo: A. J. Heinc)

MT. JASON IN THE OLYMPUS RANGE, WITH VANDA STATION IN FOREGROUND.

Some minor snowfalls have been experienced, and snow was lying for a total of 13 days in May, although only to a depth of a little over $\frac{1}{2}$ in.

During the summer the station experienced a regular pattern of up-and-down-valley winds. Although not often exceeding 25 knots these winds were sufficient both to operate the windcharger and to give Lake Vanda a reputation as "a cold place for outdoor work." However, since March, conditions have been exceptionally calm. The average wind-speed in April was only 3 knots compared with approximately 9 knots at Scott Base. Similar conditions were experienced in May although in his last message before this was written Ron Craig stated that towards the end of May, and also in early June, there had been a little more wind than usual.

The lack of wind has led to some problems with wind-power generation, and it has been necessary to take spot readings rather than continuous recordings of some heat balance parameters to reduce power consumption and hence the amount of petrol used by the standby generator. During the winter darkness period this loss of information is not proving serious, and it is expected that fuel reserves and more favourable winds will allow the recorders to be operated continuously again as soon as the sun returns.

ANNIVERSARY OF ANTARCTIC TREATY

June 23 marked the eighth anniversary of a unique agreement by 16 nations to peacefully explore and develop the "seventh continent"—Antarctica. The multilateral Antarctic Treaty entered into force June 23, 1961.

The Antarctic Treaty recognises that "... it is in the interest of all

mankind that Antarctica shall continue forever to be used exclusively for peaceful purposes. . . ." While it bars from the continent all activities of a purely military nature, it authorises the use of military personnel to support scientific research and for other peaceful purposes.

The Antarctic Treaty came about as a result of the peaceful scientific co-operation experienced during the International Geophysical Year—July 1, 1957, to December 31, 1958. In order to continue the freedom of scientific investigation which blossomed during that period, the 12 nations then conducting operations in Antarctica agreed to enact the treaty. The original signators were Argentina, Australia, Belgium, Chile, France, Great Britain, Japan, New Zealand, Norway, the Soviet Union, the Union of South Africa and the United States.

The idea of an Antarctic treaty conference was initiated in the spring of 1958 by President Dwight D. Eisenhower. At the president's invitation, the conference convened in Washington, D.C., on October 15, 1961, when the last ratification was received. The treaty may be continued indefinitely and other nations may join. Since 1959, Czechoslovakia, Poland, Denmark and the Netherlands have acceded.

Under the provisions of the Antarctic Treaty the use of nuclear weapons and disposal of nuclear wastes in Antarctica are prohibited. Another key provision allows each member nation to appoint observers who are to have free access "at any time to any or all areas of Antarctica." The agreement also encourages exchange of scientific information, personnel and results.

In addition to its value to Antarctica, the treaty has also had effect elsewhere. When a treaty regarding the future use of outer space was negotiated at the United Nations in 1966, the Antarctic Treaty provided precedents for several of its provisions.

University of Canterbury Antipodes Island Expedition 1969

by JOHN WARHAM

An eight-man team including two entomologists, one marine and two vertebrate zoologists, a mammalogist and a botanist worked on Antipodes Island from January 28 to March 12, 1969. They were transported by H.M.N.Z.S. "Endeavour" and took with them a sectional hut which served as their laboratory and cook-house. Army tents were used for sleeping.

Work done included a census of the Wandering Albatross population and of the fur seals. The latter have increased greatly since a party in 1950 reported one seal present and it seems that Antipodes has shared in the recent upsurge in numbers of *Arctocephalus forsteri* which has been documented elsewhere, e.g. at Macquarie Island. During the course of these censuses the locations of the numerous penguin colonies were also plotted.

Other research on sea-birds included detailed investigations into the breeding and behaviour of the endemic Erect-crested Penguin and of some of the petrels. Some valuable bird specimens were brought back to New Zealand of which examples of *Pterodroma mollis* and *Puffinus assimilis* are perhaps the most interesting. The former has hitherto been unknown in New Zealand and evidently is a winter breeder at Antipodes.

The botanist had a rewarding time adding a number of new species to the island's flora and more particularly examining the processes of colonisation of slips on the hillsides and gathering material for the study of the relationships of some of the endemics like *Senecio antipodus* as revealed by chromosome counts.

Extensive collections of terrestrial arthropods were made, both of

larval and adult forms and including good samples of bird ectoparasites. These collections will enable accounts of some insect groups throughout their sub-Antarctic range to be completed. The littoral invertebrates were also extensively surveyed and it will now be possible to produce a full faunal list as well as a checklist of the marine algae together with notes on their ecology.

Other work done by the party included the repair of the castaway hut and the replacement of its door and window which have been missing for many years. The party examined the whole of the island and a map is in preparation which will show details of the topography for the first time.

Among the material brought back to the mainland were live samples of the two Antipodean parrots. These will be used to establish a breeding stock in New Zealand and to supplement field work on their ecology and behaviour started on the island. The birds are reported to be doing well at the Mt. Bruce sanctuary of the Department of Internal Affairs.

The expedition was assisted by a grant from the Trans-Antarctic Expedition and many other organisations too numerous to detail here, also helped in different ways.

A Preliminary Report on the Snares Island Expedition 1968/69

by JOHN WARHAM, Dept. of Zoology, University of Canterbury

A six-man team worked on the main island of the Snares Group from November 14-29, 1968, when two members left. Those remaining continued field observations until February 25, 1969.

The party consisted of:—

- J. Warham, Leader, Nov. 14-29.
- D. B. Cameron, Deputy Leader, Nov. 14-Feb. 25.
- S. L. Bennington, Nov. 14-Feb. 25.
- B. Keeley, Nov. 14-Feb. 25.
- R. J. MacKay, Nov. 14-Feb. 25.
- E. A. Walker, Nov. 14-29.

LOGISTICS

Transport was provided by the brand new 52 ft. fishing vessel "Kutere" (Lloyd Young, skipper) of Bluff, chartered for the purpose. On each occasion the return journey was undertaken non-stop but on the first outward journey an overnight stop was made at Port Pegasus, on the second outward journey two nights were spent there due to bad weather, while on the third occasion both journeys were made without a break. Mr. Young was most helpful throughout and we were impressed by his seamanship and by the reliability of "Kutere."

As usual the party's radio equipment was overhauled and in part supplied by Mr. P. A. G. Howell of the Physics Dept. Unfortunately on the outward journey several heavy seas were shipped and some sea-water damaged the main radio designed to contact Campbell Island. This radio was replaced on the second visit of "Kutere" in late November but as expected, reception was not as good as it would have been using the original set and the aerial matched to it. In the result few messages could be sent around Christmas although it was usually possible to receive from

Campbell Island. During January and February the Campbell Island link improved. The reserve set, used for contacting ZLB Awarua and fishing boats on 204 kc. was satisfactory and useful at times, while an un-scheduled link with ZLPH Riverton was always perfect.

Finance for maintenance, expendable stores, transport and equipment was provided by a Nuffield New Zealand Research Grant, and from Departmental and University Funds.

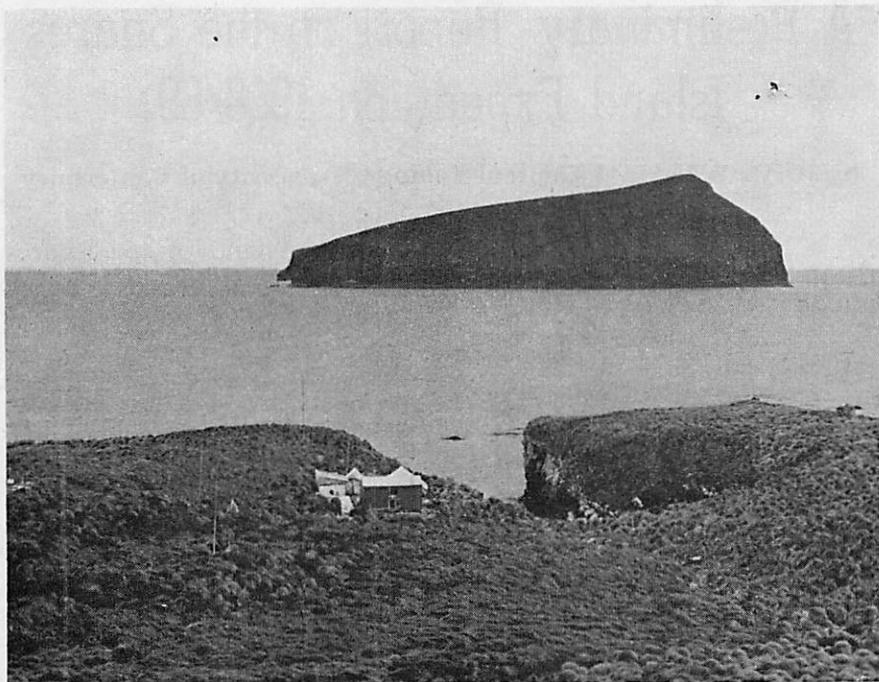
THE PRESENT CONDITION OF THE ISLANDS

No substantial changes appear to have taken place since our visit early in 1967 and the island appears to be in good heart. Before our arrival, Stewart Island had three months of the windiest weather in the memory of the Bluff fishermen and it was presumably at this time that trees were thrown in many places on the main island. Others were thrown during storms while the present party was there but in most instances the trees continued to live as the roots are seldom entirely torn from the ground.

WORK DONE IN 1968 & 1969

A. Construction and Maintenance

The Biological Station and Castaway Hut were in good condition but the water tanks collecting roof run off from the biology huts were rusted away and empty. During January and February the island experienced a long period without rain and the 200-gallon tank on the Castaway Hut, full on our arrival,



(Photo: John Warham)

CAMP SITE, REEF POINT, ANTIPODES ISLAND, and BOLLONS ISLAND.

was emptied. It was then switched to the main hut which has a larger catchment area.

Improvements made include the following:—

- (a) A "Dieselbeck" burner unit, Shacklock range and a concrete insulating surround were fitted into the main hut to provide proper cooking facilities and heat for drying clothes. This was run on kerosene and proved most successful. We owe Lloyd Young our best thanks for getting these extremely unwieldy items ashore without damage.
- (b) The main hut was fitted with a porch over the door to protect

the entrance against the prevailing wind and rain and to provide somewhere for hanging wet parkas, etc.

- (c) A concrete path was laid beside the hut to lessen the amount of mud being carried inside in wet weather.
- (d) A sink and outlet were fitted inside the main hut.
- (e) Both the huts were painted.

B. Zoological Research

1. Marine Ecology

The work done by Mr. Cameron fell into the following categories:—

- (a) An examination of the fauna living within *Durvillea* holdfasts.
- (b) General collections of Polychaetes.

- (c) Studies of the fauna of the lichen zone.
- (d) Studies of the rock pool fauna and flora, especially the high level pools on Seal Point.

2. Land Invertebrates

Mr. Bennington attempted to estimate population densities of carabid beetles on the floor of the *Olearia* forest. He used pitfall traps and various mark-recapture techniques but none was really successful, perhaps because of the high numbers of insects involved.

Mr. Walker, in a shorter study, investigated the foods and feeding habits of beetles and wetas on the forest floor.

3. Birds

(a) Further work was done on the Snares Crested Penguin as part of Mr. Warham's long-term study of the *Eudyptes* penguins. Further banding and many more measurements were made and Mr. MacKay made a complete census of the 113 colonies of this species on the island and extensive observations on behaviour and on changes during the moult.

(b) A study was made by Mr. Keeley of the aspects of the breeding behaviour of the New Zealand Mutton-bird *Puffinus griseus* and of the Mottled Petrel *Pterodroma inexpectata*. This has resulted in the acquisition of a considerable amount of new data on both these species which it is hoped to incorporate into a paper in the near future.

(c) Further work was done on the biology of Buller Albatross *Diomedea bulleri*. A census has been made of the birds breeding on the main island during this season. An intensive search was made for breeding adults banded in 1948 by Dr. Richdale and in 1961 by this department and a total of 100 banded birds was sighted, including seven of Dr. Richdale's birds which are still breeding

21 years after being banded as breeding adults. Mr. Bennington also set up a study colony on the east coast in an area where the nests are very dense, identifying the nests with numbered pegs, sexing and then colour banding the adults. He has also examined the differences in behaviour between the sexes. Much of this work can be written up for publication but an estimate of population parameters based on the disappearance of the 1948 and 1961 breeders must await yet another search in 1970 because there is a possibility that this species breeds biennially so that two years' searches would be necessary to find all the marked animals still alive.

(d) A certain amount of miscellaneous data was also recorded, wing loadings of petrels were taken as were further samples of stomach oil from these birds, and some data was collected on clutch size, breeding success and adult dimensions of Ph.D. student, J. Mills. The general studies on birds involved the banding of 870 further animals, 500 of these being adult mutton birds.

(e) New vertebrates for the Island.

The following birds were recorded for the first time:—

Macaroni Penguin
Mallard
Black-billed Gull
Greenshank
Sharp-tailed Sandpiper
Greenfinch
Australian Tree Martin
Yellowhammer.

The first of these comprises a new record for New Zealand.

(f) Mammals. No programme of research was undertaken on these but a valuable discovery was the breeding of the Southern Sea-lion *Neophoca hookeri*. Only two other breeding stations for this species are known.

RUSSIAN ANTARCTIC WHALERS

by ISOIF PIKAREVICH

Antarctic whaling flotillas depart the Soviet Black Sea port of Odessa every autumn and return in summer, after a hard and dangerous season, to a heroes' welcome.

The expeditions continue for seven to eight months, ships covering set distances of over 50,000 miles. Their route lies across the Black Sea, the Atlantic, Indian and Pacific Oceans—across 10 seas altogether—before they reach the whaling grounds in the Southern Atlantic. On the way, they pass the hot tropics, the stormy 40th latitudes and the hazardous icefields crowded with icebergs.

Each flotilla includes floating factories—huge ships with a displacement of more than 40,000 tons and with departments for cutting whales, automatic lines for the processing of whale products and freezers and big tanks for storing fuel and raw materials.

The chasers—small, speedy motorboats, with engines of several thousand horsepower—are needed to chase the whales, which weigh up to 100 tons and move through the water at 25 m.p.h.

RAMMED

Hazards abound. In flotilla, "Sovetskaya Ukraina," in which the writer travelled, a harpooned whale dived under the chaser, hitting the propeller and putting the boat out of action.

On another occasion, a fatally wounded whale rammed the boat and part of its huge body slid on to the low deck. The ship listed and began to sink, but the whale was dying and its 60-ton carcass slowly slipped back into the sea.

Even without these attacks, the whalers' life is pretty hard. Here is what Boris Morgun, captain-director of the flotilla, has to say about the latest trip to the Antarctic.

"While we were hunting for whales, as many as 60 cyclones passed across the whaling grounds. There was an unceasing storm. Sometimes the sea stayed rough for weeks. The crews of the whale chasers had it particularly hard, as waves now swung them up high, now hurled them into a deep precipice. It was difficult to keep upright on a wet deck and still more difficult to spot a whale and to hit it.

"The Antarctic summer is not only severe—it is short, too. There is no time to be wasted on waiting for good weather, be it snow, blizzard or storm. The whales are very timid and careful, and it takes a great deal of self-control, strong nerves, keen eyes and physical hardiness to get them."

TEAMWORK

The success of a whaling expedition depends not only on the harpooners, of course. The flotilla has many people of various specialities—ship handlers, mechanics, carcass cutters, fat boilers, helicopter pilots, who do reconnaissance work from the air, scientists who study the nature of the Antarctic. The results of the expedition depend on their teamwork, on the expert co-ordination of the work of the flotilla's ships and production shops.

Modern equipment has made the whalers' work much easier. The hunting motor boats are fitted out with the latest harpoon guns and various electronic mechanisms and devices. But it is people who dictate success. Whale processing was much easier to improve. This is how it is done in practice: the hunting motor boats pull up alongside

the high sides of the mother ship to hand in their catch. After that, they sail back to sea. The whale carcasses, resembling half-sunk submarines, await their turn to be cut and processed.

NO WASTE

Powerful hoists pull the whale carcass on board in a matter of minutes. On the dressing deck—the size of a football pitch—cutters, armed with special knives resembling hockey sticks, work like virtuoso surgeons. They know the whale's anatomy well, and quickly strip the whale of fat and meat and take out the liver. The processing of raw materials is fully mechanised.

Every part of the whale has its use. The skeleton is cut into small fragments by mechanical saws and ground into bone meal. Nothing is left of the carcass except excrements, which are thrown away.

From the dressing deck the fat goes to the boiler where automatic devices maintain the necessary temperature and control the whole process. The freezing is also done automatically. Television cameras are used to observe the course of production processes.

Many people are unaware how often they use whale products. The best types of margarine are made of whale fat obtained from the so-called "whiskered" whale. One big whale yields as much fat as a herd of 1,000 pigs. Polyvitamin tablets are made of whale liver. Tablets for treating slow-growing children are obtained from the pituitary gland of the cachalot whale. The cachalot's spermacetic fat is of great value; it is indispensable in treating bad burns and is widely used in perfumery. Women might be interested to know that the best ointments are made of spermaceti. The most lasting expensive perfumes are made of ambergris which is also obtained by whalers.

Whale products go into making many more things: fishmeal for cattle and poultry, tinned meat, leather, technical oils for precision instruments, gelatine, glue, buttons and insulin.

NEWS FROM BELLINGSHAUSEN BASE

The Soviet polar explorers from the Bellingshausen Station have accomplished extensive biological works, headed by Dr. V. I. Krylov. They have compiled the first detailed description of sea mammals and birds in that region. In gulfs, bays and on the coast of the Waterloo Island they have studied different species of seals: sea elephant, sea leopards, and crab-eaters. On the island itself there are 15 species of birds, including sea-gulls, blue-eyed cormorants, gigantic storm petrels and, of course, colonies of penguins.

RUSSIAN SHIP AT FREEMANTLE

The Russian whaling vessel "Besstrashnij" arrived at Freemantle, West Australia, to take on fresh food supplies early in May. The 840-ton whalechaser left the Russian whaling fleet of 17 chasers and a mother ship in the Southern Ocean some days before, and took on supplies for all the vessels.

Included in the supplies were one and a half tons of sour cream, ten tons of potatoes, one and a half tons of lemons, a ton of cottage cheese, eight tons of cabbages, two tons of onions and ten tons of fruit, mainly apples and oranges.

The whaling fleet had been away from Russia for about six months, and was then on its way back to the Black Sea from Antarctic waters.

RUSSIAN WHALING SKIPPER DIES

The critically-ill captain of a Russian whaling vessel died at sea on the morning of April 13 as the ship sped towards Wellington.

Captain Saljnikov, from Vladivostok, died from a ruptured stomach ulcer, the Russian Consul in Wellington (Mr. V. I. Smirnov) reported.

The whaling ship, the "Sourvoi," rejoined its whaling fleet the following day.

SCAR Working Group on Geology

By R. W. WILLETT, Chairman.

In this article I have attempted to outline the growth and work of one of the Working Groups of the Scientific Committee for Antarctic Research (SCAR). As a matter of interest, the name changed from Special Committee to Scientific Committee in 1958. The Working Group described is that on Geology. It has been one in which New Zealand has been prominent since its formation.

New Zealand has made considerable contributions to the geology of Antarctica and has taken seriously the responsibility for the geology of nearly one-third of the exposed rock of Antarctica that lies within the Ross Dependency. Since 1959 the entire Victoria Mountains from just south of the Beardmore Glacier to the Rennick in the north has been geologically mapped, using as a base pioneer topographic work by Lands and Survey Department.

At the first meeting of SCAR in The Hague, February 1958, the formation of three Working Groups was approved, of which Group II was to concern itself with geology, glaciology, morphology, and cartography. At that meeting the initial report of Working Group II was presented by L. M. Gould (United States). At the second meeting in Moscow, 1958, a separate working group for cartography was approved. At that meeting the recommended scientific investigations were approved and it was agreed that the programme for geology, in addition to classical studies, special attention should be directed to:

- (a) The terrain beneath the ice as revealed by seismic studies.
- (b) Post-glacial and/or Quaternary geology at coastal stations.
- (c) Paleoclimatic studies.
- (d) Paleomagnetic studies.
- (e) Submarine geology.

The third meeting of SCAR, in Canberra, 1959, appointed reporters

for the working parties. The author was assigned to the Working Group on Geology. At this meeting the original Working Group II was further concentrated by the establishment of a Working Group for Glaciology.

Although not an outcome of the Working Group for Geology, geology was supported by 19 papers at the Antarctic Symposium held at Buenos Aires, November 1959. This was at first collective attention to the results of initial geological work commenced during I.G.Y. Readers should remember that the Falkland Islands Dependency Survey had been carrying out topographic and geological work in that area before I.G.Y. but it was not until I.G.Y. that geology began again in Victoria Land after a break of some 50 years.

At the fourth SCAR meeting held in Cambridge, U.K., 1960, the working groups were given permanent status and the author became chairman of that for Geology. The Working Party that met in 1960 at Cambridge consisted:

R. W. Willett (Chairman)
A. Cailleux
V. E. Fuchs
T. Gjelsvik
L. M. Gould
M. M. Somov

The group heard reports on progress of geological work in Antarctica and discussed future programmes. Out of these discussions the Group proposed a number of recommendations to guide Antarctic

geological work. These recommendations, accepted by the SCAR Plenary session, are reproduced below:

- (a) That member nations when preparing regional geological maps do so sheet by sheet, each sheet carrying a brief, approximately 5,000-word, summary of the geology thereon. This is in no way considered to replace geological reports and bulletins, but is designed to enable the maps to be available for other specialist workers without the inevitable delay arising from the preparation of bulletin texts;
- (b) that where possible geological map series be published on the same scale as the corresponding topographic map series. For large-scale maps it is recommended that SCAR member nations consider, for discussion at next SCAR meeting, the possible uniform use of certain large scales for detailed geological maps;
- (c) that the member nations of SCAR continue geological mapping in the Antarctic. That colour schemes, symbols, and abbreviations be circulated to all SCAR member nations for comments, and that a correlation of these comments be presented to the next SCAR meeting;
- (d) that, prior to the next meeting of SCAR, the member nations give consideration to the following points for discussions:
 - (i) production of geological maps,
 - (ii) geological symbols and colours,
 - (iii) stratigraphic and formation names, correlation, proposals to be prepared for next meeting,
 - (iv) co-ordination of isotope dating of Antarctic rocks,
 - (v) any other relevant matter.
- (e) that the Soviet proposals for geological mapping in the Antarctic be circulated with a view to discussion at the next SCAR meeting;

- (f) that the Oceanographic Group be urged to continue work on submarine geological studies. It is further recommended that deep samples by the piston coring method be obtained. The Working Group draws attention to the desirability of more rapid publication of bathymetric and echo-sounding data.

The Working Group notes the existence of overlap in the proposed work programmes of several participating nations and suggests that these differences be resolved bi-laterally in order to prevent any unnecessary waste of man-power and logistics.

The recommendations of this Group gave rise to some amendments of the original recommended scientific investigations approved by SCAR. The changes called for some attention to systematic mapping as will be seen in the amended recommendations published.

Systematic regional mapping on sheets based on the recommendations of the Working Group on Cartography.

Although the nature of the geology and the area of exposures will control scale of sheets, it is recommended that each participating country retain one scale throughout for the regional geological maps in the sectors in which it has agreed to work. In addition to regional mapping and its ancillary studies (petrological, palaeontological), the Antarctic calls for attention within the basic framework of regional geology:

- (a) Geomorphology and Quaternary geology including work of ice, frost and wind.
- (b) Palaeoclimatic studies.
- (c) Palaeomagnetic studies.
- (d) Geochemical studies of rocks and minerals.
- (e) Terrain beneath the ice in association with geophysical studies.
- (f) Volcanology, study of past and present volcanisms and its products.

(g) Structural geology.

The fifth meeting of SCAR at Wellington, New Zealand, January 1962, saw another meeting of the Working Group in Geology. Those present were the following:

R. W. Willett (Chairman)
 K. E. Bullen
 R. H. Clark
 A. B. Ford
 Sir Vivian Fuchs
 T. Gjelsvik
 H. M. Pantin
 R. N. M. Panzarini
 M. J. Ravich
 F. C. Truter
 R. H. Wheeler

Again, as at other meetings, the Working Group received reports and made a number of recommendations concerning Antarctic geological work. The most important was that recommending a Symposium on Antarctic Geology. The following is the recommendation itself and was accepted by the final plenary of SCAR:

RECOMMENDATION V.G-7

"In view of the complexity of the problem of stratigraphic and formational names and rock definitions, the Group recommends that a meeting of Antarctic geologists be held in 1963 under SCAR auspices and preferably in conjunction with a SCAR meeting. A preliminary programme for this meeting will be drawn up by the Chairman for circulation before the next SCAR meeting. It is the opinion of the Group that such a meeting should not be in conjunction with any other large geological conference as it is felt that this meeting should be attended by Antarctic geologists only. Also, it is considered that by 1963 a large number of geological maps and publications now being prepared will have appeared, and the extent of geological knowledge of Antarctica should be correspondingly greater, hence the opportunity for profitable discussions would be increased."

At the sixth SCAR meeting at Boulder, U.S.A., August 1962, South Africa confirmed its invitation to hold the Geology Symposium at Capetown in

connection with the seventh meeting of SCAR. This was accepted and the Working Group were asked to work out details. Although the Working Group did not meet at Boulder, a report was presented by the Chairman on the progress following the various recommendations accepted at the fifth SCAR.

The 1963 Symposium on Antarctic Geology was the first bringing together of geologists of all member nations of SCAR. The success of this meeting exceeded initial expectations, for delegates were able to discuss the results of at least five seasons' work, and as a result the critical points and areas of Antarctic geology showed up most clearly. The papers presented were published in single volume in 1964 (edited by Dr. A. J. Adie), a volume which has had a wide sale.

At the seventh SCAR meeting held at Capetown in 1963, the Working Group on Geology met and reviewed the progress of action arising from early meetings. The following were present:

R. W. Willett (Chairman)
 R. J. Adie
 P. Bellair
 T. Gjelsvik
 L. M. Gould
 I. R. McLeod
 D. C. Neethling
 E. F. C. H. Rohwer
 E. S. W. Simpson
 W. J. Talbot
 T. Tatsumi
 F. C. Truter

Among the recommendations, all later accepted by the final plenary of SCAR, was one that all future geological symposia should be under the joint auspices of SCAR and IUGS (International Union of Geological Sciences) and that the next meeting be held in 5-7 years' time. The rising tide of knowledge of Antarctic geology was being reflected in the need to prepare new geological maps of the whole of Antarctica. The nomination of R. J. Adie (FIDS) as a vice-president for Antarctic geology in the Commission for the Geological Map of the World is significant.

Recommendations were also concerned with the Stratigraphic Lexicon of Antarctica, list of isotope dates and translation. The Working Group also recommended the setting up of two depositories of published geological information, with rock specimen and fossils at Geology Department, University of Capetown, South Africa, and at University of Canterbury, New Zealand. This has been accepted and does function. Aware of certain unique geological sites in Antarctica, the Working Group sought to draw to all Antarctic personnel the importance of preserving such sites.

The Working Group did not meet again until the 1968 tenth SCAR meeting in Tokyo, and acting on a recommendation from the ninth SCAR 1966, joint meetings were held with the Solid Earth Geophysics Working Group. There were present at Tokyo for the Geology Working Group the following:

R. W. Willett (Chairman)
 R. J. Adie (Secretary)
 N. H. Fourcade
 I. R. McLeod
 T. van Autenboer
 J. Nougier
 T. Tatsumi
 Y. Harada
 K. Kizaki
 K. Suwa
 Y. Yoshida
 T. Yoshikawa
 L. E. Kent
 C. Craddock
 M. G. Ravich

The Geology Group met for a week in addition to the joint meetings with the Solid Earth Geophysics Group. The joint discussion on common problems, the contributions to geological problems by geophysicists and the greater understanding by geologists of the results of geophysics in Antarctica were but a few of the real benefits. In addition, it was agreed that the recommended 1970 Symposium at Oslo be sponsored jointly by the two working groups and of course by SCAR and IUGS. The success of the Tokyo meeting owed much to the fact that R. J. Adie has agreed to act as Secretary, which means there is someone to look after

the paper of such meetings which is of great assistance to the chairman and the meeting.

Antarctic geologists will meet again in Oslo in 1970 but this time their geophysical colleagues will be with them and the Working Groups are sure that the Capetown success will be repeated but on a broader base, really an Antarctic earth science meeting.

New Zealand has played an important role in the Working Groups concerned with earth sciences. Dr. Robin Adams is now secretary of the Working Group on Solid Earth Geophysics, a post formerly held by Dr. E. I. Robertson, and the author has been chairman of the Geology Working Group since its inception, and is at present also IUGS representative at SCAR.

Several collective efforts organised by the Working Party on Geology will be completed or near completion by the time of the Symposium in 1970, such as a geological map of Antarctica, stratigraphic lexicon, revised list of Antarctic minerals, revised compilation of all Antarctic rock ages to be published in English and Russian, an atlas of metamorphic rocks. The importance of the 1970 Symposium and Working Group meeting to the collective thinking and consolidation of Antarctic geology is obvious and it is hoped that all nations active in the geological and geophysical field will be represented.

ANTARCTIC REUNION IN AUCKLAND

Following the receipt of a list of Antarctic people in Auckland from Mr. Donnelly, the Secretary of the Wellington Branch, Mr. Keith Wise, was able to organise a muster of 20 people to a convivial and film evening in Auckland. After suitable refreshments three films covering the Ross Dependency area and the Auckland Islands were shown. The evening was voted such a success that it is hoped it will prove to be the first of a series.

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.

Dear Sir,

I am a boy of 20 years of age. I collect stamps and letters. Six months ago I began to collect stamps of the Antarctic Territories.

Please can anyone give me any information about stations, ships, labour and technical details in these territories.

I would be happy to make pen friends from members of any of the expedition bases or from the Post Offices in the Antarctic.

I hope that you can perform my wishes.

Uew Ruppel,
415 Krefeld
Dilbornstrasse 10
Western Germany

DR. CUMPSTON RETIRES

An Australian who has a long and close association with the New Zealand Antarctic Society is due to retire on July 2 from the Australian Department of External Affairs, after serving for 33 years, longer than any other officer in the Department.

Dr John Cumpston, 60, of Campbell, joined the department when it had only eight members. Today there are more than 2,000.

During the past nine years Dr Cumpston has become well known through his published works as the departmental historian. His works include a guide to shipping arrivals and departures at Sydney, 1788-1825, a pictorial record of the siege of Tobruk and a history of Macquarie Island.

Describing his years in the department, Dr Cumpston said it had been a most interesting and rewarding period, but over the years he felt the department had lost "some of the personal touch."

Dr Cumpston went to Canberra in 1928 and joined the Commonwealth Crown Solicitor's Office in 1933. He transferred to the Department of External Affairs two years later.

In 1939, together with Mr E. P. Bayliss, he compiled the first reliable map of Antarctica. During World War II he was mentioned in despatches for service in Tobruk and later commanded a company of ski troops in Lebanon.

He then served in the Allied Geographical Section of General MacArthur's headquarters.

He opened the Australian Legation in Chile in 1949 and in 1950 became Official Secretary at the Australian High Commissioner's Office in Wellington, and then became Australian Consul in Noumea. He has been departmental historian since 1960.

Dr Cumpston was in Wellington when the N.Z. Antarctic Society was advocating a New Zealand Expedition, and he was most helpful in advice and assistance during his sojourn here.

Over the years John has been a very good friend to the Society, and has made his collection of cuttings from the Australian Press Cuttings Agency available free of charge to the Editor, and thus has enabled items which would not otherwise be available to be noted.

We greatly appreciate all he has done for the Society, and wish him a long and happy retirement.

SOCIETY NEWS

CANTERBURY BRANCH

Mr. Randall Heke, the Canterbury Branch's president, writes as follows:

On March 3 Admiral Abbott, Jnr., Commanding Officer, Operation Deep Freeze, spoke to the branch and showed a new presentation of slides entitled "Ice, Facilities and Money."

The slides illustrated how the vast amount of money spent in the Antarctic was used in maintaining the established facilities, logistic support and scientific operations.

The Annual General Meeting was held on May 8 and the elected office bearers are:

President: Mr. R. M. Heke.

Vice-Presidents: Miss R. McLean,
Mr. H. C. Gray.

Immediate Past President: Mr. H. F. Griffiths.

Hon. Secretary-Treasurer: Mrs. Barbara Burley.

Hon. Auditor: Miss I. O. Orchard.

Committee: Rev. J. Keith; Messrs. B. Duffell, A. Anderson, F. Gurney, J. Claydon, J. Mather, S. Smith, B. George; Mesdames C. W. Collins and M. Williams.

The membership of the branch now numbers over 200 and continues to grow. It has been a pleasant surprise to see so many of the 1968 Antarctic tourists renewing their subscriptions, and many have written and expressed their interest and appreciation in the Bulletin and also of the pleasure of visiting New Zealand and of the hospitality they received on their journey south.

This year the Mid-Winter Dinner was held on Saturday, June 21, at the Sign of the Takahe, Cashmere Hills, Christchurch. Guest speaker for the evening was Les Quartermain who retired last year as Editor of the Bulletin. Les spoke on what he thought would be the future developments in the Antarctic within the next ten years. No doubt his prophesy will be watched with great interest by those fortunate enough to hear his outstanding address.

Special guests of the evening were the Mayor and Mayoress of Christchurch, Mr. and Mrs. A. R. Guthrey, Mr. and Mrs. Harry Ayres and Mrs. Robin Foubister, wife of the present leader at Scott Base.

A special item of interest was the playing of a tape recorded message from Mr. C. R. Ford, one of the last two survivors of Captain Scott's first expedition to the Antarctic in 1901-04. Mr. Ford went south at the age of 21 as chief steward of the "Discovery."

Notwithstanding the cold wintry weather, it was a most successful and enjoyable evening, notable for the number of young people who attended and men who had previously been to Scott Base.

Congratulations to Pamela Young on being selected to accompany husband Evan Young to the Antarctic this coming summer. Mrs. Young will share the experience of Marie Darby and Dorothy Braxton, two other lady members of the branch who visited McMurdo Sound in 1968.

WELLINGTON BRANCH

A well-attended meeting on April 10, at the National Club Lounge, Customhouse Quay, heard a most interesting address on Macquarie Island, one of the sub-Antarctic Islands regularly mentioned in the Bulletin.

Chris Thomas, now with the Fisheries Division of the Marine Department, spent 15 months at Macquarie and aboard one of the Danish vessels relieving the Australian Antarctic bases. He spoke of his experiences, and showed a film entitled "Margin for Life," the material for which he filmed whilst at Macquarie as a biologist, and which has recently been produced by Pacific Films of Wellington.

The Branch hopes that it may be possible to sponsor one or more members to work again for a short period at Cape Royds as Curators at the penguin rookery and the historic hut. This may also extend to Hut Point and Cape Evans if the tourist influx develops to any extent.

ANTARCTIC BOOKSHELF



DICTIONARY CATALOG OF THE MAP DIVISION

The Research Libraries of the New York Public Library. To be published by G. K. Hall & Co., 70

Lincoln St., Boston, Mass., U.S.A. The *Dictionary Catalog of the Map Division*, The Research Libraries of The New York Public Library, will be published in 10 volumes by G. K. Hall & Co. of Boston.

This dictionary catalog lists maps and other cartographic publications from early American and European rarities to up-to-date representations of all parts of the world, including sheet maps of the Map Division. A depository for the U.S. Army Map Service, the division also has extensive holdings of maps issued by foreign governments. Navigation charts before 1900 of the U.S. Hydrographic Office, the U.S. Coast Survey, and the U.S. Coast and Geodetic Survey are represented in the catalog by place entry cards. In addition, the catalog contains entries for manuscript maps in the Manuscript Division, early printed maps in the Rare Book Division, and the Phelps Stokes American Historical Views in the Prints Division.

The 6,000 atlases in the Map Division from the 17th century to the present include the work of Mercator, Blaeu, Jansson and other early cartographers. Analytical entries have been made for the maps in 17th- and 18th-century world atlases; all the works of Ptolemy, Ortelius and Lafreri in the Rare Book Division as well as atlases published prior to 1600 are similarly analysed here. There is an extensive collection of facsimile atlases, covering many fields; some of them, such as those by Nordenskiöld, Jomard, Santarem, Kretschmer and Karpinski, have their places carefully analysed. The collection of historical, regional and thematic atlases is also exten-

sive. Among the regional atlases are many covering states, counties, and cities of the United States. Comprehensive coverage of the 19th-century county atlases and those of New York City from the middle of the 19th century enrich the collection.

There are nearly 11,000 volumes other than atlases including works relating to the history of maps and the techniques of map making, periodical articles and bibliographies. Maps and articles contained in non-cartographic books, and periodicals housed in other divisions of the library, are represented by analytical cards.

The Catalog, with an estimated 175,000 cards, will be reproduced in 10 volumes and has a prepublication price of \$585.00 in the U.S. and \$643.50 elsewhere. After January 31, 1970, the price will be \$730.00 in the U.S. and \$803.00 elsewhere.

ANTARCTIC MAP FOLIO SERIES: Nos. 10 & 11

Folio 10: "Primary Productivity and Benthic Marine Algae of the Arctic and Sub-Antarctic." By E. Balech, S. Z. El-Sayed, G. Hasle, W. Neushul, and J. S. Zanefield. Published by the American Geographical Society, Broadway at 156 Street, New York, 10032, 1968, 11 pp. and 15 plates. US.\$6.00.

An Argentinian, a Norwegian and three American scientists have joined together to produce the text and the maps of this splendid publication.

Antarctic biological exploration dates back to the British expedition under James Clark Ross, when Dr. J. D. Hooker, the botanist and surgeon, called attention to the fundamental importance of phytoplankton in the economy of the sea. Later expeditions carried out investigations of a purely descriptive nature

on the marine organisms of the Antarctic regions, and the "Discovery" Investigations, commencing in 1925, heralded a new phase which stressed the dynamic aspect of Antarctic biology, with particular emphasis on whales and the factors influencing their migration, food, feeding habits and breeding cycle. Again, the IGY programme saw scientific investigation in the Antarctic waters expanded, and this programme is still gaining momentum.

Folio 10 is primarily concerned with the biological productivity and related aspects of Antarctic and sub-Antarctic waters. Maps showing the distribution and abundance of the phytoplankton standing crop, as well as primary productivity are presented. The nutrient chemicals of these waters are also given in an effort to correlate the productivity with the distribution and concentration of the nutrient salts.

The highly fertile waters surrounding Antarctica present a marked contrast to the cold, rugged and hostile continent with its sparse vegetation. The special feature of the southern waters that lead to their high fertility are discussed in the section under Primary Productivity. Through the mechanism of vertical circulation in certain regions, including the Antarctic, the nutrient-rich deep waters are brought to the surface and luxuriant plant growth results, and in these regions many of the world's largest fisheries are located.

Plates 1 to 8 summarise what is known of the distribution of phytoplankton standing crop, C¹⁴ uptake, nutrient salts, and particulate and dissolved organic carbon in the Antarctic and sub-Antarctic waters. These show a surprising amount of variation.

In presenting the distribution of the productivity parameters in Plates 1-8, two types of maps are used. In one, surface values are plotted, in the other, values are integrated through a column of water extending from sea surface to the depths of the euphotic zone (except for the nutrient salts collected in the Antarctic sector where the

values are integrated from the surface to a depth of 150 m.

Plates 9 and 10 cover the diatom flora of Antarctic and sub-Antarctic. Although diatoms are cosmopolitan in their distribution, some species are found only in the Antarctic, others only in sub-Antarctic waters. The species shown in the plates were selected as being representative of the approximately 100 species which are present in Antarctic and sub-Antarctic areas. About 40 data sources were used in mapping the species.

The maps of Plates 11 and 12 give some indication of the present knowledge of the distribution of dinoflagellates south of 35°S. A small number of species which are well identified are significant in their distribution, and have been collected by at least two expeditions, were chosen for mapping and distribution.

The final three plates cover Benthic Marine Algae. Because the collections of predominantly subtidal marine flora are so scattered and generally so incomplete, conclusions concerning overall distribution patterns are extremely tenuous. However, field observations carried out along the coasts of Ross Island and Victoria Land in the summer of 1963-64 revealed a widespread marine algal bottom vegetation at depths to 35 m.

Folio 11: "Distribution of Selected Groups of Marine Invertebrates in Waters South of 35°S Latitude."

By A. W. H. Bé; H. Boschma and T. P. Lowe; J. S. Bullivant; E. W. Dawson; J. H. Dearborn and J. A. Rommel; R. K. Dell; S. J. Edmonds; H. B. Fell and S. Dawsey; H. B. Fell; T. Holzinger and M. Sherraden; M. W. Foster; S. R. Geiger and C. Brahm; J. W. Hedgpeth; N. S. Hillman; D. E. Horley; V. M. Koltun; P. Kott; D. L. Pawson; A. Ross and W. A. Newman; D. F. Squires. Published by the American Geographical Society, New York; 1969, 44 pp. and 29 plates. US.\$10.00.

American, New Zealand, Australian, Russian and Dutch scientists have combined to present this far-ranging

account and mapping of the marine invertebrates of the Antarctic and sub-Antarctic regions. It is estimated that the Antarctic is 400% more productive than the rest of the oceans. The dominant animal of the Antarctic is the krill (*Euphasia superba*), which in the past supported the stocks of whales and upon several species of penguins, other birds and many fishes depend. Recent estimates suggest that the potential fishery of *Euphasia superba* might exceed that of all the other fisheries of the world combined, but would involve difficult processing problems.

Most of the information concerning the distribution of marine life is based on studies of the plankton of the upper layers and of the benthos; considerably less being known about the deeper regions. The surface waters of the Antarctic comprise a relatively uniform biogeographic region, characterised by very high primary productivity which in turn is associated with a rich zooplankton population.

While many recent workers, including most of the contributors to this folio, do not find clear evidence of distinct East and West subregions, Kolman, in his article, notes differences in the sponges of East Antarctica, including McMurdo Sound, and West Antarctica, and believes that this cannot be explained on the usual grounds of inadequate collections.

The Plates include two sheets each on: Planktonic Foraminifera; Porifera; Nemertea; Pycnogonida; Planktonic Ostracoda; Amphida Hyperidea; Asteroidea; Ophiuroidea; and Ascidiacea; and one sheet each on: Stylasterina; Scleractinia; Brachiopoda; Bryozoa; Sipuncula and Echiura; Benthic Mollusca; Cirripedia; Nebaliacea; Crinoidea; Holothuroidea; and Echinoidea.

EARTH'S CRUST THICKER THAN THOUGHT

The Earth's crust has hitherto been considered, on theoretical grounds, to be not more than 25 miles thick.

But in reality it is a lot thicker, Soviet geologists report.

Seismic probing techniques they have used in Queen Maud Land establish the thickness of the crust there as ranging between 20 and 35 miles.

"The study of hundreds of seismograms and analysis of geophysical observations have changed former theories of the Antarctic platform as a homogenous structure," said the head of the Soviet Antarctic expedition, Dmitry Solovyov.

Structure of the crust in Arctic and Antarctic regions will now be compared at Leningrad Institute, Solovyov said.

It will be possible after a study of the materials at the Institute of Arctic Geology in Leningrad to compare the peculiarities of the Earth's crust in the Polar regions, said Solovyov.

Scientists also hope to find out how this structure is influenced by the ice cover.

FIFTH WOMAN SCIENTIST NAMED

The last member of the five-woman American scientific party has now been named. She is 19-year-old Miss Terry Lee Tikhell, of Barnesville, Ohio; a third-year student at the Ohio State University and also attends the University's Institute of Polar Studies. The ladies will arrive in Antarctica in November for a study term of three months.

NEW MAP FOR "ANTARCTIC"

Two members have drawn attention that the map which has been in use for many years either on the inside of the cover or on the inside back page of "Antarctic" was no longer as clear as it should be. The Lands and Survey have kindly drawn a new map, which will now be used.

"ANTARCTIC"

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

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

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

The New Zealand Antarctic Society

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

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

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

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

New Zealand Secretary

Mr. V. E. Donnelly, P.O. Box 2110, Wellington.

Branch Secretaries

Canterbury: Mrs. B. Burley, P.O. Box 404, Christchurch.

Wellington: Mr. V. E. Donnelly, P.O. Box 2110, Wellington.

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