ANTARCTIC

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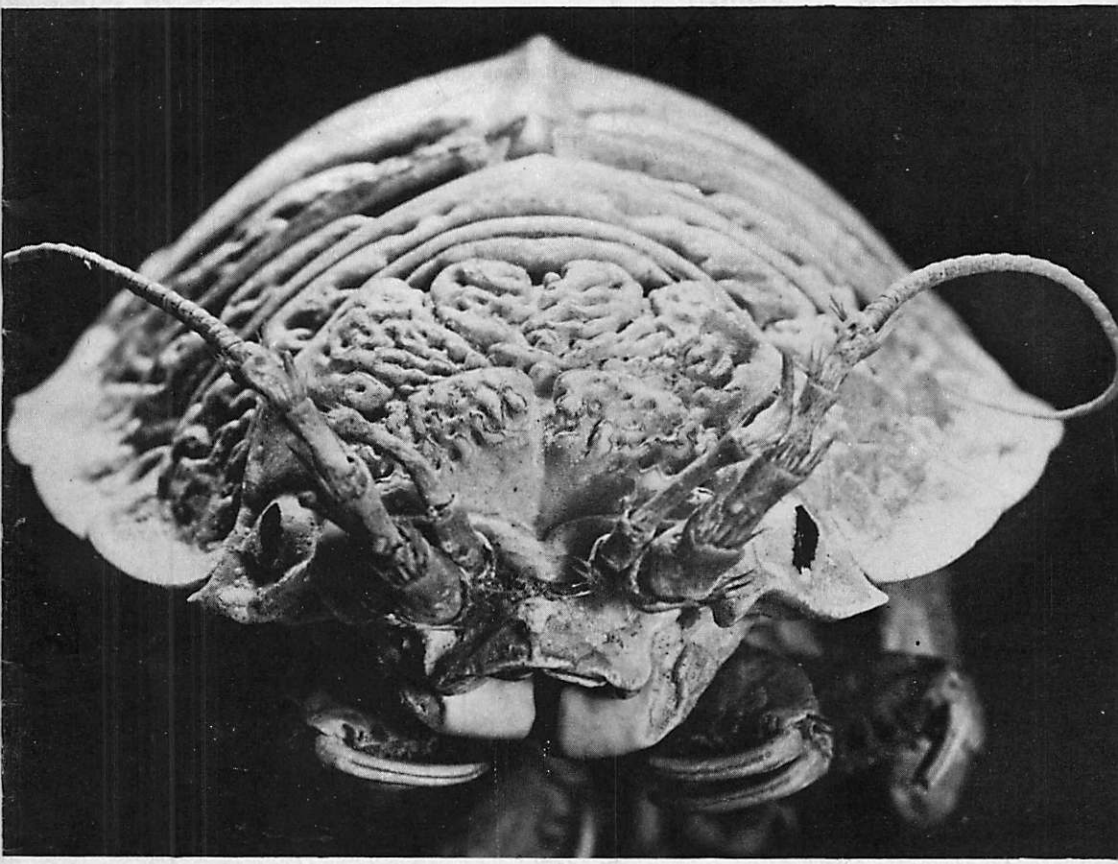

THIS IS THE HEAD OF GLYPTONOTUS ANTARCTICUS, OTHERWISE THE GIANT ANTARCTIC SLATER. ITS HEAVILY-PIGMENTED EYES ARE ONE OF THE FEATURES WHICH MAKES IT AN EXCELLENT EXPERIMENTAL ANIMAL FOR VISION RESEARCH CONDUCTED THIS SEASON AT SCOTT BASE BY DR V. B. MEYER-ROCHOW, A UNIVERSITY OF WAIKATO BIOLOGIST.

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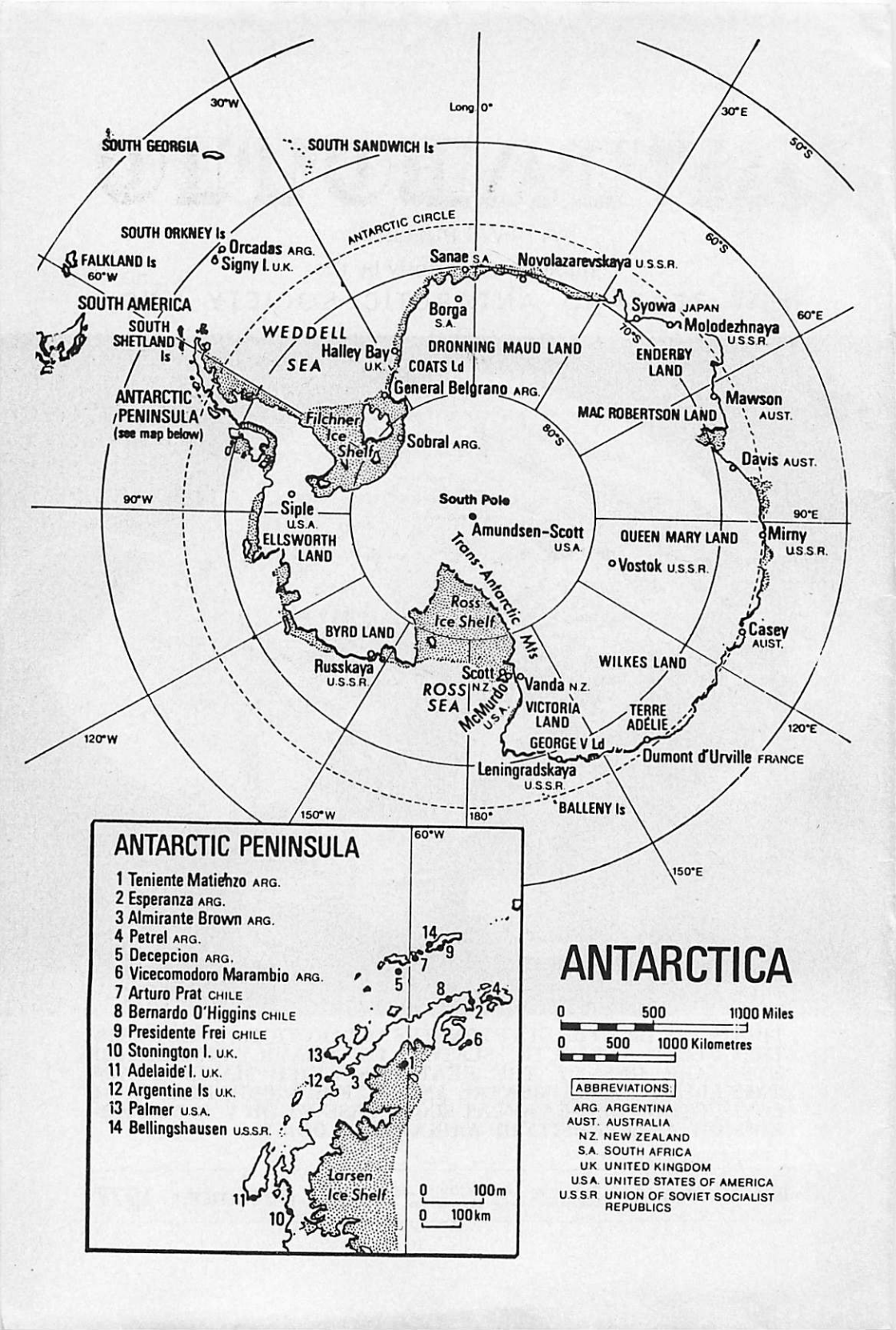

ANTARCTIC PENINSULA

1 Teniente Matienzo ARG.
2 Esperanza ARG.
3 Almirante Brown ARG.
4 Petrel ARG.
5 Decepcion ARG.
6 Vicecomodoro Marambio ARG.
7 Arturo Prat CHILE
8 Bernardo O'Higgins CHILE
9 Presidente Frei CHILE
10 Stonington I. U.K.
11 Adelaide I. U.K.
12 Argentine Is U.K.
13 Palmer U.S.A.
14 Bellingshausen U.S.S.R.

ANTARCTICA

0 500 1000 Miles
0 500 1000 Kilometres

ABBREVIATIONS:

ARG. ARGENTINA
AUST. AUSTRALIA
N.Z. NEW ZEALAND
S.A. SOUTH AFRICA
U.K. UNITED KINGDOM
U.S.A. UNITED STATES OF AMERICA
U.S.S.R. UNION OF SOVIET SOCIALIST REPUBLICS

"ANTARCTIC"

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NEW ZEALAND FIELD RESEARCH PARTIES

By the middle of this month the first part of the New Zealand Antarctic research programme for 1977-78 was in full swing. The programme began officially on October 8 when the first party arrived to relieve the winter team of 10 men at Scott Base. In the next two months New Zealand field parties or summer support staff were flown by United States Navy Hercules aircraft and helicopters to the dry valleys of Victoria Land, the glaciers of the Royal Society Range, Cape Bird, on Ross Island, and even as far south as the South Pole.

This summer New Zealand scientists will work at Vostok, the Soviet station on the Polar Plateau, known as the coldest place on earth, which is 1250km from Scott Base. For the third successive season there are New Zealanders at the Amundsen-Scott Pole Station. Two of the four will remain to run the meteorological programme next winter. New Zealand geologists are working with the United States research programme in Marie Byrd Land from a field camp on the Hobbs Coast, and other New Zealand scientists are participating in the international Ross Ice Shelf Project, studies of Mt. Erebus, and the Erebus Ice Tongue project in McMurdo Sound.

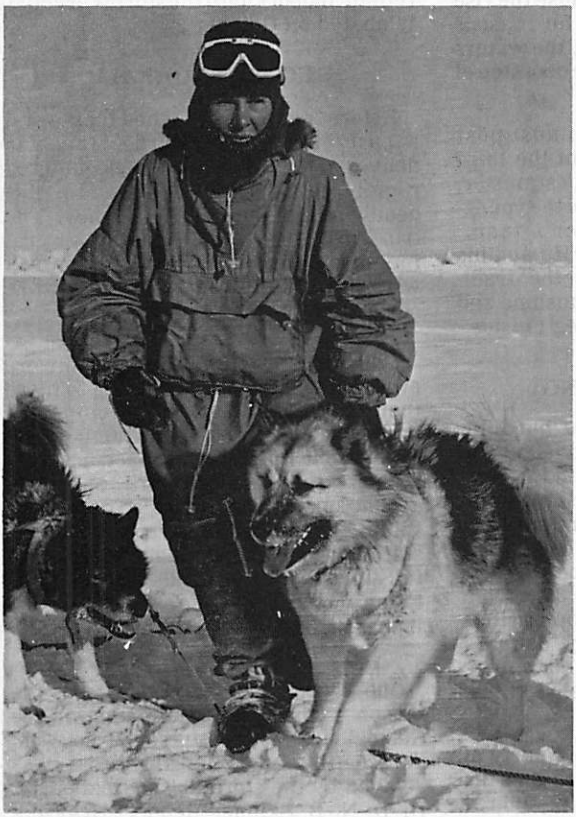
Early this month the Royal New Zealand Air Force completed nine flights, two more than last season, using two Hercules wheeled aircraft, to provide logistic support for the New Zealand and United States programmes. This is the 13th season that the R.N.Z.A.F. has carried passengers and cargo between New Zealand and Antarctica.

First of the cargo flights was made on November 12 to transport a heavy bulldozer to McMurdo Station. This machine, weighing about 10 tonnes, replaced another flown to the Marie Byrd Land field camp. The R.N.Z.A.F. Hercules was called upon because it can carry a greater payload than its American ski-equipped counterpart.

FIRST ARRIVALS

New Zealand's summer programme began as soon as the first of the support staff reached Scott Base on October 8. Mr R.S. Straight, who will be in charge at Scott Base this season, Mr N. C. McPherson, executive officer, Antarctic Division, Mr J. R. Lythgoe, who will lead the winter team, and the base engineer, Mr J. R. Thomson, were on the first flight. Mr J. S. Rankin, who was in charge last winter, and base engineer, hauled down his leader's flag, and Mr Straight took over for the summer season.

Four scientists also arrived at Scott Base on October 8 to continue their psychological and psychological studies of the winter teams. They were Professor A. J. W. Taylor, professor of clinical psychology, Victoria University of Wellington, who has been a "first footer" at Scott Base for nine previous summers, and Professor R. A. M. Gregson, Dr A. Barabasz, and J. Barton (technician), psychology department, University of Canterbury. The latter made psychometric tests of the winter party — their first "before-and-after" study of men who winter at Scott Base — using electronic equipment to compare



Patricia Harris, first woman dog-handler at Scott Base, with Clara (left) and Muff, two of the huskies she drove 76km to Cape Royds and back this month.

Antarctic Division photo

results with Professor Taylor's interview and observation methods.

By the third week of October the summer support staff had settled in, and ws busy preparing for the dispatch of field parties. First item on the programme was to check huts and equipment at Vanda Station, staging base for the parties working in the dry valleys, where the normal scientific projects will be resumed.

HIGH WINDS

Checking was done by Mr. McPherson, who flew to the station, 130km west of Scott Base, in a United States Navy helicopter. He found the station in excellent condition after eight months of solitude, but the seven huts on the shores of Lake Vanda were not left completely unscathed by their ninth winter. Their western sides have been severely sandblasted by high winds in the Wright Valley.

Mr. McPherson flew to Vanda Station by way of Lake Bonney in the Taylor Valley. There the Americans examined the hut built in 1961 to house scientists and field laboratory equipment for summer work in the Taylor Valley. The hut will

be removed this season because the rise in dry valley lake levels — for reasons yet unknown — has brought the waters of Lake Bonney almost to the doorstep of the hut.

New Zealand's southernmost post office opened for business in the third week of October when the postmaster, Randolph Waller, who will be the youngest member of next winter's team, raised the Post Office flag. He and his four colleagues performed the traditional ceremony in bright sunshine and a temperature of minus 16deg Celsius.

SURVIVAL TRAINING

Post Office staff work inside, handling the large volume of mail and telephone calls from New Zealanders and Americans. Outside the base in the same week the New Zealand snowcraft and survival training team, Peter Farrell, John Horsley, and Bryan Carter, began their programme on the ice cliffs 3km from the base with American helicopter pilots from McMurdo Station. By January they expect to train 200 men and women, including all members of the New Zealand programme.

On October 24 the first field party of the season flew by helicopter to open the University of Canterbury field sttion at Cape Bird where the biological research unit is continuing its annual studies of the Adelie penguin rookeries, the penguin and skua census, and marine physiological studies of selected invertebrates. Lloyd Davis (zoologist) and Max Wenden, Antarctic Division field assistant, were to have flown in on October 22, but were delayed by cloudy weather.

This cloudy weather was the forerunner of a series of storms which lashed the McMurdo Sound area for nearly a week, leaving Scott Base blanketed with snow. Southerly winds of more than 70 miles an hour, blowing snow, and visibility reduced to only 50m, forced the cancellation of all flight operations. Everyone at Scott Base, Vanda Station, and Cape Bird, had to remain indoors until the storms gradually abated on October 27.

RECORD SNOWFALL

Before tne storms reached their worst a party went to McMurdo Station to deliver outward mail. It encountered rapidly growing snowdrifts and a stiff headwind on the return journey. The trip was of no avail because several incoming flights from Christchurch with mail, supplies, and staff, were postponed.

Conditions at McMurdo Station were even worse. There winds rising to more than 95 miles an hour were accompanied by a wind chill factor of minus 60deg Fahrenheit. Visibility dropped to slightly more than half a metre, and most ground operations were also cancelled. When the storm blew itself out the station was left with the heaviest snowfall since 1960. Ten inches of snow fell in three days, breaking the record 9.6 inches of 1960 over 23 days.

One of the main field events of the season — the detailed mapping by the Geological Survey of the region between the Koettlitz and Blue Glaciers — was delayed by the storms. The field party, Dr D. N. B. Skinner (leader), R. Findlay, Margaret Clark, and Anne Wright, was unable to leave Scott Base for the area east of the Royal Society Range until October 29. It was to have started from the Skelton Glacier, but bad weather forced the United States Navy helicopter pilot to put the party in on the Foster Glacier.

Because of the weather the party had to sledge between the Foster and Renegar Glaciers instead of using motor toboggans. These arrived on later flights when the weather finally cleared, and the party began the first of its expected 80 days in the field travelling towards Heald Island. This party will be the longest in the field, the most remote from Scott Base, and will cover the greatest distance.

POLE PARTY

In the first week of November the men and women at Scott Base said hullo and goodbye to their southernmost colleagues — John Waller, Keith Herrick, Kevin Bisset, and Tim Hurst — who flew to the Amundsen-Scott Pole Station to take part in the United States Meteorological programme. They received a warm welcome from Simon Norman and Lloyd Anderson, who had not seen any New Zealanders for nearly a year. John Waller and Kevin Bisset will not leave the South Pole until November next year.

One of the three teams of Victoria University's 22nd expedition began its fourth successive study of the Taylor Glacier and its surrounds, which lie west of McMurdo Sound. Three U.S. Navy helicopters put in the team — Paul Robinson, Walter Fowlie, an Antarctic Division field leader, and two surveyors, J. Palmer and N. F. Nalder. Alan Hull, a V.U.W. honurs student, joined the team later in the month. Also with the team for a week was Colin Monteath, field operations officer, Antarctic Division.

When the team left Scott Base was still thickly blanketed with snow from the October storms, but the temperature was a relatively warm minus 9deg Celsius, and there was only a 13-mile-an-hour wind. The departure was observed high in the sky by 230 day trippers to Antarctica — passengers on Air New Zealand's second DC10 flight.

SEA ICE TRIP

Last season members of the University of Canterbury's research unit spent three months studying an isolated Weddell seal population on White Island, and the benthic community in the tide crack there. The research could not be continued this season, but on November 6 the leader of the team at Cape Bird, Paul Ensor, and Elspeth Waghorn, returned to White Island by sno-trac across the sea ice of McMurdo Sound.

The pair used pick and shovel to dig through the tide crack, which is narrow and frozen over at this time of the year, to collect water samples for their studies last summer of species of plankton living under the ice. They took about nine litres of water samples which will be examined when they return to New Zealand late in January. The weather was not exactly kind. When they tried to filter the water it froze — the temperature was about minus 15deg C.

A week later the two biologists flew to Cape Bird where they will continue their studies of plankton. Dr. Y. Yom-Tov, from the University of Tel Aviv, was unable to join the unit to study the effect of interference on penguin breeding success. He was replaced by Graham Wilson from the University of Canterbury. Dr M. Crawley will join the unit next month.

RESEARCH FISHING

Fishing for research, not sport, began in McMurdo Sound last month. As a part of their studies of the metabolic adaptions of polar fish and invertebrates to constant low temperatures, Drs John McDonald and Rufus Wells, of the University of Auckland, tried to catch Antarctic cod from a hole blasted in the sea ice, using a fish trap, baited lines, and lures. As well as temperatures of around minus 1deg C. they had to cope with Weddell seals which used the hole as a breathing passage between feeding dives, and were suspected of reducing the catch by eating or scaring away all the fish nearby.

On a recent trip to Cape Royds, however, with some American divers from McMurdo Station, the scientists obtained two small Antarctic cod-like fish, one called a plunderfish. Other catches in the fish trap included marine isopods 10cm long, sea spiders, red sea urchins, and long-armed starfish. So far these are the only catches which can be used in the experiments.

Another party headed by an experienced fisherman, Dr Warren Featherston, of the University of Otago, who has been studying parasites found in notothenid fishes for several seasons, also began

fishing on the McMurdo Sound sea ice last month. Dr Featherston and his two assistants, Roslin Freeth and Craig Ellison, collected their fish from a hole drilled in the sea ice, working in a hut with a hole in the floor over the ice hole.

SEAL COUNT

During last month support staff from Scott Base were busy making the annual counts of Weddell Seals along the shores of Roos Island and on the sea ice of McMurdo Sound. The second census of the season was made from a U.S. Navy helicopter, and more than 700 adults and many pups were counted. After the census the base team, headed by Alan MacLeod, assistant maintenance officer, who was in charge of the counting, called at Cape Royds to pick up another census taker, Patricia Harris, who had been counting Adelie penguins in the rookery near Shackleton's hut.

Because Cape Royds is the world's southernmost Adelie penguin rookery, it has been designated by the Scientific Committee for Antarctic Research (SCAR) and the Antarctic Treaty nations as a site of special scientific interest. New Zealand is now required to provide annual reports to SCAR and the treaty nations, giving details of the census figures and other observations.

During her stay at Cape Royds Patricia Harris counted about 2500 adult birds. Most of the females had laid eggs which were expected to hatch in the next few weeks, bringing the population probably to its peak for the season.

ROCK STUDIES

Most of the field parties were working in the dry valleys, and particularly the Taylor Valley, by the end of last month. After a week north of Scott Base studying the lava flows on the slopes of Mt. Erebus, a second Victoria University team, headed by Dr Jim Johnston, and including two students, Nick Logan and Jim Metson, and a field assistant, Jocelyn Lang, flew to the Upper Taylor Valley on November 21. Its purpose was to make geochemical studies of the rocks, and later in the season in the Wright and Victoria Valleys.

Two scientists from the Geophysics Division, D.S.I.R., spent two weeks last month making a gravimetric survey across the mouth of the Taylor Valley at New Harbour. Steve Hicks and Dave Bennett also worked across the valley near Lake Fryxell, tying in with the old Dry Valley Drilling Project holes. They took gravity readings from the Sues Glacier down to the sea ice of McMurdo Sound. These, after analysis, will help to indicate the depth of glacier debris lining the valley floor.

Two Massey University microbiologists spent a week in the dry valleys collecting samples of soil, water, and ice, as part of a Health Department distribution study of the amoebae which cause "hot pool" primary amoebic meningo-encephalitis. The disease is known as "hot pool" meningitis because New Zealand victims contracted it in mineral pools.

FROZEN LAKE

Dr Tim Brown and Ray Cursons made their first camp in the windy Taylor Valley beside Lake Fryxell, which was frozen over. Their introduction to life in the field was to struggle for more than an hour to pitch their polar tent in gusts whipping up to 55 miles an hour. They collected samples of glacier melt water and soil, and drilled through four metres of ice into Lake Fryxell to obtain samples from underneath the ice.

After working at Lake Hoare further up the Taylor Valley, the two scientists were flown by U.S. Navy helicopter to the Wright Valley, and became the first field party to work out of Vanda Station. They collected samples from Lake Vanda, and then moved to the western shores of Ross Island. There they worked at Cape Evans and Cape Royds, and took samples from material such as pony straw around the historic huts. Also they took samples in the Adelie penguin rookery at Cape Royds.

A team of six scientists from the Waikato University Antarctic research

Antarctic still life: members of the Geological Survey party working between the Koettlitz and Blue glaciers face the camera at Dismal Ridge, below Mt. Rucker (3816m). From left: Anne Wright, Margaret Clark, Dr David Skinner (leader) and Bob Findlay. Antarctic Division photo

unit, led by Professor Alex Wilson, began the consolidation of some five years' work on glacial advances in the dry valleys of the McMurdo Oasis, concentrating first on the Taylor Glacier and the Taylor Valley. One member of the team, Dr V. B. Meyer-Rochow, remained at Scott Base to study benthic forms in McMurdo Sound.

Two members of the team, Professor Wilson, and Dr Chris Hendy, flew to the Soviet station, Vostok, to continue a survey of the accumulation of salts in the snow of the Antarctic ice-caps. They arrived there on December 18, two days after the 20th anniversary of the establishment of the station.

WORK AT VANDA

Vanda Station's population of four, including the leader, Eric Saxby, was increased last month by the arrival of two Ministry of Works and Development hydrologists, Trevor Chinn and Tim Omundsen, and two surveyors, John Palmer and Nigel Nalder. They started this summer's monitoring of selected dry valley glaciers, the flow of the Onyx River, and the levels of Lake Vanda and other major dry valley lakes. The hydrologists will also continue tracking the movement of the McMurdo Ice Shelf. They will return home about the middle of this month.

Later this month three scientists from the New Zealand Oceanographic Institute will take part in the Ross Ice Shelf Project in which scientists of several nations will study the physical, chemical, biological, and geological conditions beneath the Ross Ice Shelf. Dr Janet Bradford will seek samples of pelagic copepods from under the shelf, Neville Day will carry out benthic biota studies on the sea floor, and Bill Whitley will take temperature measurements at various depths down the drill hole through the ice shelf.

Giant Antarctic slater and vision research

For several years Dr V. B. Meyer-Rochow, of the department of biological sciences, University of Waikato, has been engaged in vision research, and has studied the eye of the giant Antarctic slater Glyptonotus antarcticus (Isopoda). He is continuing his studies in the field this summer as a member of the University of Waikato Antarctic research unit. Working mainly from Scott Base, he will be able to use fresh instead of preserved specimens of Glyptonotus in his research.

The Antarctic slater Glyptonotus antarcticus is neither abundant nor is it of any economical importance. It is, however, large, is closely related to forms that occur in the deep-sea, can be caught relatively easily by diving, and has two heavily-pigmented eyes, all features which make it an excellent experimental animal for visual research.

From preserved specimens and scanning electron micrographs of the head region, we now know that Glyptonotus has compound eyes, which are not compartmentalised externally, but which retain the ommatidial unit-system of the typical compound eye below the smooth and uniform cornea. For reasons not yet fully understood the eyes are relatively larger and darker pigmented in younger specimens of Glyptonotus. The eyes are oval in shape, and in an 8cm (body lenght) specimen have an external radius of curvature of 4mm. They are surrounded by unusual, stalked, featherlike hairs, each of which measures 80mm in length. These cuticular hairs seem to gradually grow over the eye and reduce the corneal area in older individuals of Glyptonotus.

The environment in which this animal lives is characterised by extraordinarily constant temperatures and unusual light conditions. For many months, in winter, Glyptonotus, lives in perpetual darkness, but its eyes are not degenerated as in the related deep-sea species. On the other hand, during the summer the animals are continuously exposed to light. How does this affect eye ultrastructure and visual performance?

This year we will attempt to gain some insight into the adaptional mechanisms which govern the eye's sensitivity and limit of resolution. The ultrastructure of dark and light-adapted eyes will be studied with the transmission electron microscope. Also the behaviour of the animal to different lights (colour intensity and polarisation), its orientation to black and white stripes, and the reaction of unilaterally-blinded animals will all be used in elucidating how Glyptonotus uses its eyes and what it can actually see with them.

Particular attention will also be given to temperature adaption, for most sensory systems are affected by temperature changes in one way or another. Because of the uniform environment in which Glyptonotus lives, it is expected that it will exhibit temperature effects better and more unambiguously than other animals.

The work on Glyptonotus eyes, as outlined above, is likely to be of greater relevance to sensory physiology than the layman would think, because visual principles are basically the same irrespective of whether one studies slater, rat or man.

Two versions of the badge now worn by men and women who work in Antarctica with the New Zealand Antarctic Research Programme. It replaces the familiar black kiwi on a yellow background worn by New Zealanders for many years.

Designed by a Christchurch artist, Maurice Conly, the badge shows Mt Erebus and the five stars of the Southern Cross as they appear on the New Zealand flag. One badge has the design in light and dark blue, white, and red with the inner and outer rings in gold, and white lettering on a black background. White rings, and white lettering on a gold background, are used in the other badge.

Mozart on ice

Mozart has come to the Antarctic again this summer. Dr D. N. B. Skinner, leader of the Geological Survey team working between the Koettlitz and Blue Glaciers, is rehearsing the role of Leparello, servant to Don Giovanni, which he will play in an Auckland performance of Mozart's opera.

Dr Skinner first began mixing geology and opera in the 1975-76 season when he worked in the Skelton Glacier area. When blizzards kept the Geological Survey party tentbound for days on end, he rehearsed, with the aid of a tape recorder, for the baritone role of Guilemo, in Mozart's opera, "Cosi Fan Tutti". On some days he sang for two or three hours.

In 1975-76 Dr Skinner returned home and exchanged glacier ice for the stage after 77 days in the field. This season he will be in the field for 80 days. His only audience then will be Bob Findlay, Margaret Clark, and Anne Wright.

More husky pups at Scott Base

Four husky pups from a litter of five born at Scott Base towards the end of October have increased the dog population to 25. In August two of the base huskies, Teia and Betty, celebrated sunrise in their own fashion, and the results of their union appeared a week after the doghandler, Steve Chambers, of Waiouru, built Betty a fibreglass-lined kennel to keep the pups warm during their first few weeks.

Two of the pups will be named after dogs in Scott's last expedition — Noogis (Nugis) and Vaida. The other two will be named Helge and Jens, after members of Amundsen's teams. Helge was killed after reaching the South Pole, Jens died on an earlier journey.

These new arrivals have a proud lineage. Tiea is a son of Apolotok, the biggest of the Scott Base huskies when he died last winter. Betty's father was Osman, the grand old man of the dog lines, and the oldest husky at the base when he died in January, aged 10 years.

Nina and Nemaluk, two huskies brought from Australian Antarctic bases in March for exhibition in the Adelaide Zoo produced a litter of two male pups early in July. Nemaluk, a black four-year-old came from Mawson, where he was born in July, 1973. Nina, a fawn 3½-year-old, was also born at Mawson in October the same year. She was shipped to Davis in late February, 1974, to act as the station pet.

U.S. Science projects this summer

Evaluations of Antarctica's mineral and marine living resources are among 90 projects in the United States Antarctic Research Programme this season. More than 330 scientists in the programme, which is costing the National Science Foundation $45 million, are engaged in research areas as far apart as Marie Byrd Land, on the Ross Ice Shelf, around the Antarctic Peninsula, at the South Pole, in Victoria Land, and on the East Antarctic ice sheet.

This research includes a geological reconnaissance of the Orville Coast portion of the Antarctic Peninsula — completed last month — which will produce information about the mineral resource potential, a geological and geophysical survey of the Hobbs Coast area of Marie Byrd Land, and an extension from Victoria Land to Marie Byrd Land of the survey of radioactive elements in exposed rocks, which was started last season. The survey is designed to assess the potential for uranium and thorium resources.

Marine resources of commercial interest are being studied again in the Antarctic Peninsula area. Catches of the dominant species of Antarctic krill (Euphausia superba) are being taken from the research vessel Hero in the Bransfield Strait, among the Palmer adn Biscoe archipelagos, and in the Scotia Sea. The purpose is to obtain population data and growth rates, and to study the factors which cause krill to swarm.

Biological productivity studies of the northern Weddell Sea, the southern Indian Ocean, and the waters of the Ross Sea off West Antarctica, are being made aboard the United States Coast Guard icebreaker Glacier. Full knowledge of the productivity of these waters and the factors controlling production is regarded as basic to the potential harvest of Antarctic marine living resources.

MAJOR EVENT

This month one of the main objectives of a major event in the programme — the Ross Ice Shelf Project — to drill through the floating shelf so that any possible life can be studied — was achieved. On December 2 engineers and technicians, using a new flame-jet drill, cut through 420m of ice to the waters of the Ross Sea which have been in perpetual darkness under the shelf for at least 120,000 years.

In December last year the drilling project had to be terminated when ice flowing under the pressure of its own weight blocked the drill assembly when the hole had reached a depth of 330.3m. And this time there was another initial setback — sea water gushed up, flooded the 25cm hole, and then froze before closed circuit television cameras could be lowered into the hole to study the dark waters and the seabed below the shelf.

LIFE UNDER SHELF

Provided the hole can be kept open, 36 scientists from six nations — Australia, Norway, the Soviet Union, New Zealand, Denmark, and the United States — will spend more than a month studying the environment under the ice shelf. They will look for life in the 200m of water under the ice, take tidal, temperature, and salinity measurements, and collect samples of the water and the seabed sediment. Ice cores will be

A polar tent camp on the Orville Coast of the southern Antarctic Peninsula where United States geologists and topographic engineers are making a geological mapping reconnaissance of about 6000 square kilometres of previously unvisited mountains. The party was flown there from McMurdo Station, more than 2500km away. U.S. Navy photo

collected from another hole drilled with conventional equipment.

Research on the ice shelf since 1973 has included the related Ross Ice Shelf Glaciological and Geophysical Survey (RIGGS). In the fourth and final season its scientists are completing investigations of the ice shelf's physical characteristics, working from the RSP drill camp, J9, about 664km south-east of McMurdo Station, and two other sites. Supported by a chartered Twin-Otter aircraft from Canada, they are surveying ice thickness, water depth, sediment thickness, crustal structure, seismic wave velocity, and electrical resistivity in and under the ice shelf.

MANY PROJECTS

This summer scientists from universities and scientific organisations, the National Aeronautics and Space Administration, and the National Oceanic and Atmospheric Administration, are engaged on a wide range of projects related to atmospheric and earth sciences, glaciology, oceanography, meteorology, and the study of bird and marine life. Several of these projects are being carried out in co-operation with scientists of other nations.

United States scientists are associated with those of Britain, Japan, the Soviet Union, New Zealand, Australia, Norway, Denmark, France, and Argentina. As in past seasons the British Antarctic Survey's Royal Research Ship Bransfield has transported most of the resupply material for the Hero, and Palmer Station, on Anvers Island, off the Antarctic Peninsula.

Two remote projects this season are the geological and geophysical survey in Marie Byrd Land, which is based on preliminary field work in the 1966-67 and 1967-68 seasons, and the geological reconnaissance of the Orville Coast area by the United States Geological Survey, which has been combined with a topographic survey of the Lassiter and

Orville Coasts. Both projects have been supported by U.S. Navy Hercules aircraft which have put in scientific parties after long flights from McMurdo Station.

FIELD CAMP

With air support a field camp, ,Mabel I, has been established in Marie Byrd Land about 1600km from McMurdo Station on the Hobbs Coast in a generally flat snow-covered area with exposed mountain peaks. To enable the scientists to map geologic structures, determine the ages of rock formations and their radioactivity, and to study extinct volcanoes and volcanic rocks, three helicopters were flown to the area by Hercules aircraft.

To explore the Orville Coast portion of the Southern Antarctic Peninsula seven geologists and four topographic engineers covered an area of about 6000 square kilometres of previously unvisited mountains.They travelled by motor toboggans and set up tent camps to make petrologic, stratigraphic, structural, and paleontologic studies of folded fossiliferous marine sedimentary rocks of Jurassic age, as well as petrologic, paleomagnetic, geochemical, and istopic studies of igneous and metamorphic rocks of Jurassic and Cretaceous ages.

Another U.S. Geological Survey team has extended into the Sweeney Mountains area of the Orville Coast the geodetic control established during two previous seasons in the adjacent Lassiter Coast area. This is to meet vertical and horizontal control requirements for 1 : 250,000-scale topographic maps.

FOSSIL SEARCH

Two geological teams are working in the central Transantarctic Mountains. One from Wayne State University, Michigan, is exploring the proven fossil fields of the Fremouw Formation, Cumulus Hills (85deg 15min S/175deg W), to collect early Triassic amphibians, reptiles, and fish. Fossils collected in this area in the 1970-71 season came from many different species, and bore a marked faunal correspondence eith collections of nearly the same age from other continents.

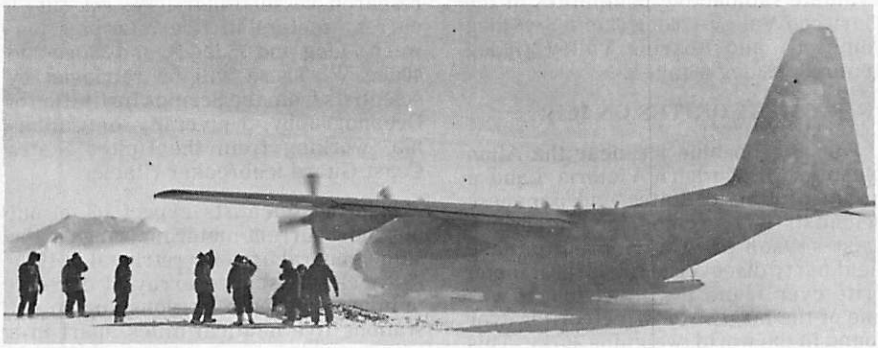
A second party from Ohio State University is studying the stratigraphy and sedimentary petrology of the Lower Triassic vertebrate-hearing beds in the Cumulus Hills. Its purpose is to reconstruct the depositional environment and provenance of the Freemouw Formation, determine the occurrence patterns of fossiliferous beds, and locate additional fossil beds.

Geologists from Columbia University wil examine the processes involved in the creation of the Antarctic Peninsula, the Scotia Arc, the underwater Scotia Ridge, and the southernmost Andes. Their work in the South Shetlands, and further south to Marguerite Bay, is expected to contribute to an understanding of the breakup of south-western Gondwanaland, a process that is still poorly understood.

ROCKET FIRING

Siple Station, which is at the base of the Sentinel Mountains in Ellsworth Land, is about 2500km from McMurdo Station, and is the remotest American station in Antarctica. This summer it is the base for several upper atmosphere projects. Among the projects are studies of changes in the earth's magnetic field produced by magnetic storms and ultra-low-frequency waves propagating in the earth's magnetosphere, and probduced by magnetic storms and ultra-low-frequency waves propagating in the earth's magentosphere, and probing of the magnetosphere to determine the relationships between very-low-frequency radio waves and particles in the magnetosphere.

This season scientists from the University of Houston and the National Aeronautics and Space Administration will fire at least three Super Arcus solid propellant rockets into the lower ionosphere in an experiment designed to improve understanding of how very-



A United States Navy Hercules aircraft ready to return to McMurdo Station after making a flight of more than 2500km to put a party of geologists on the Orville Coast of the southern Antarctic Peninsula.

U.S. Navy photo

low-frequency radio waves trigger electrons to precipitate into the earth's upper atmosphere from the magnetosphere. The X-ray flux in the atmosphere will be measured at altitudes of 80km and below by instruments aboard the rockets.

Research for the last three seasons into the concentration distribution of man-made fluorocarbons and related chlorocarbons in the Antarctic atmosphere has revealed a steady increase in the atmospheric concentrations of these chemicals. This is consistent with their similarly observed buildup in the atmosphere of the Northern Hemisphere.

POLLUTION LEVELS

This analysis of halocarbons in the atmosphere and the snow and ice is being continued this season near Mc Murdo Station and the Amundsen-Scott South Pole Station. In the last three seasons there has been a more rapid increase in chlorocarbon atmospheric levels as compared to fluorocarbon.

Geophysical monitoring continued at the Pole Station to identify present pollution levels and long-term trends in the concentration of significant constituents that may affect the environment and possible induce climatic change. Scientists from the National Oceanic and Atmospheric Administration are making measurements of surface aerosols, atmospheric turbidity, total solar radiation, and trace gases such as carbon dioxide and ozone.

This summer and next winter aerosols will be collected near the Pole Station, both at the new clean air facility completed last season, and at a site about 5km from the main station. The collection is part of a study of the sources and distribution of atmospheric trace elements by the University of Maryland.

NEW RADAR

A newly installed radar system at Palmer Station will be operated this season by a scientist from the Desert Research Institute, University of Nevada System. The 3cm wavelength system provides information on storms within 150km of the station, and sea ice and iceberg movements and formations. It is also used to track migrating flocks of various bird species. The radar system is linked by ATS-3 satellite directly to the institute in Reno, Nevada.

In southern Victoria Land University of Kansas scientists will make a radioactivity survey, using airborne gamma-ray spectometry Data from the survey of the distribution and concentration of radioactive elements will enable an assessment to be made of the uranium and thorium resource potential of the surveyed area. Last season's survey will be extended southward, and will

evaluate radioactive pegmatites of the Garwood Valley (78deg 02min S/164deg 15min E) and Roaring Valley (78deg 16min S/163deg 06min E).

METEORITES ON ICE

Working on blue ice near the Allan Nunatak in southern Victoria Land a group of United States and Japanese scientists is searching for meteorites. Last season an American-Japanese field party discovered the largest meteorite ever found in Antarctica. It was one of the larges stony meteorites ever found in the world, weighing 407kg. This was one of 11 found in Victoria Land. Nine came from the Allan Nunatak, and two were found at Mt Baldr in the Upper Wright Valley. One was found to have a terrestrial age of about 1.7 million years.

Dr William A. Cassidy, associate professor in the department of earth and planetary sciences, University ofPittsburgh, who was in last season's party, has with him this year Dr Brian H. Mason, of the Smithsonian Institution's division of meteorites. The Japanese group is headed by Dr Keizo Yanai, meteorite curator in the National Institute of Polar Research, Tokyo. He collected 11 meteorites in Victoria Land last season.

PENGUIN BEHAVIOUR

In a project designed to discover the role of penguins in the Antarctic marine ecosystem a field team from the State University of New York is spending the summer on King George Island in the South Shetlands. To extend its observations of the behaviour and ecological adaptions of Adelie, Chinstrap, and Gentoo penguins for a whole year, on member of the party will spend next winter at Poland's new Arctowski Station (62deg 10min S/58 deg 28 min W) established in Admiralty Bay, King George Island, last season.

Late in the season the International Weddell Sea Oceanographic Expedition will again investigate the formation of Antarctic bottom water in the southern Weddell Sea. Last season the Norwegian research vessel Polarsirkel set out 10 current meters in five moorings between 74deg and 75deg S. and 33deg and 40deg W. These will be retrieved by scientists from the Scripps Institution of Oceanography, University of California, working from the United States Coast Guard icebreaker Glacier.

Also the scientists expect to set out nine new current meter moorings in the same general area for retrieval in 1978-79. A closely-spaced array of current-temperature-depth stations (up to 441 stations five nautical miles apart in a square grid) will also be made in this area during the season.

Christmas gifts

Christmas gifts for four New Zealanders at the Amundsen-Scott South Pole Station were flown south from Christchurch this month. A special parcel of two Christmas cakes and home-made biscuits for the men at the Pole — John Waller, Keith Herrick, Kevin Bisset, and Tim Hurst — was included in a consignment of 11 Christmas cakes and 40 dozen biscuits from members of the Canterbury branch of the New Zealand Antarctic Society.

For the last 14 years members of the society have sent biscuits and Christmas cakes to New Zealanders working in the Antarctic. As in former years the cake and biscuits will be shared by men and women at Scott Base and in the field. The field parties will have an aerial delivery, weather permitting, and the gifts will arrive on Christmas Day or New Year's Day if there is any delay.

Airlift of 100 penguins to United States

Eighty Adelie and 20 Emperor penguins collected at Cape Crozier and in the McMurdo Sound area were flown from the Antarctic to San Diego, California, last month aboard a United States Military Airlift Command Starlifter. They will be used in the establishment by the Hubbs-Sea World Research Institute of a permanent breeding colony of Antarctic penguins for long-term research and education.

This was the third large consignment of penguins to be flown from the Antarctic. Eighty Adelie and 20 Emperor penguins were safely transported in November, 1975, but all died from smoke inhalation in a fire which destroyed the quarantine building. Last year's consignment — 95 Adelies from the McMurdo Sound area, and 40 Emperors from Cape Crozier — all arrived safely.

Dr Frank S. Todd, curator of birds and senior research associate at the Hubbs-Sea World Research Institute, and three assistants, collected the penguins last month with the support of United States Navy helicopters. The birds were needed to supplement breeding and research stock that failed to acclimatise after last year's airlift. This year the consignment included 80 Adelie eggs and 12 skuas.

After the birds were brought to McMurdo Station they were kept in a wire enclosure. For the special flight to San Diego they were placed in special containers, and the Starlifter's cabin was kept at a temperature of minus 5deg Celsius. Other precautions were taken to ensure safe and humane transport of the birds, and in San Diego they received additional acclimatisation.

Conservation trophy awarded to Project Jonah

This year for the first time the New Zealand Antarctic Society's Conservation Trophy has been awarded to an organisation — Project Jonah in New Zealand. The award, announced by Mr R. G. McElrea, chairman of the Canterbury branch of the society, has been made in recognation of Project Jonah's contribution to the preservation of the world's whaling stocks, particularly in Antarctica.

There have been five previous awards of the trophy — a 43cm carving of an Emperor penguin in African walnut, which was presented to the Canterbury branch by one of its members, Mr Peter I. Voyce, in 1971. The trophy is awarded to any person or organisation contributing significantly to any aspect of Antarctic conservation — preservation of historic buildings and flora and fauna in the Antarctic or on sub-Antarctic islands.

As a result of Project Jonah's efforts in New Zealand the Government has banned imports of whale products, rejoined the International Whaling Commission, and drafted a Marine Mammals Protection Bill. The trophy has been accepted on behalf of Project Jonah by one of its original members, Mr Graeme Martin. His organisation receives a certificate to mark the award, and holds the trophy for a year.

Since the first award in 1972 the Conservation Trophy has gone to individuals who have worked in the Antarctic or sub-Antarctic. Previous awards have been made to J. N. Foster (1972), L. B. Quartermain (1973, posthumous), B. N. Norris (1974), E. R. Gibbs (1975), P. M. Sagar (1976).

TREATY MEETING

Antarctica's resources and environment

Interim measures designed to check exploration and exploitation of Antarctica's mineral resources while the environmental effects of such activities are being studied and assessed were agreed to by the ninth consultative meeting of representatives of the Antarctic Treaty nations held in London from September 19 to October 7. The meeting also agreed to the drafting of a regime designed to protect the marine living resources of the oceans surrounding Antarctica on which the continent's ecosystem revolves.

Thirteen nations were represented at the meeting. They were the 12 original signatories of the Antarctic Treaty — Argentina, Australia, Belgium, Britain, Chile, France, Japan, New Zealand, Norway, South Africa, Soviet Union, and the United States — and Poland, which was admitted as a consultative member earlier in the year.

On mineral resources the representatives agreed to recommend to their governments to urge their nationals and others to refrain from mineral exploration and exploitation while intensive studies on the environmental implications are carried out. Preliminary meetings next year, and the next full consultative meeting in Washington in 1979, will work out an internationally agreed approach to other aspects of possible mineral exploitation.

Under the terms of the unanimous resolution on marine living resources a special meeting will be held next year — probably in Canberra in February and March — to draft a regime for the protection of krill and all other living resources. The draft regime will allow "rational harvesting". It will not spell out what quantities of krill or fish can be taken by individual nations, but will impose an overall limit on the total permissable catch to prevent overfishing and protect the Antarctic ecosystem.

Ways of increasing research co-operation will be considered when the regime is drafted. In the meantime the representatives will recommend that all the nations "show the greatest possible care and concern to avoid the depletion of stocks or the jeopardising of the marine ecosystem." A special meeting will probably be held in Washington late next year to ratify the draft regime drawn up at the meeting in Canberra.

One of the most important decisions of the consultative meeting was to extend the suspension of territorial claims provided for in the Antarctic Treaty to cover mineral and marine pending the establishment of permanent rules to govern the exploitation of these resources. The treaty, when first drafted, was concerned primarily with scientific research, and did not cover exploration and exploitation of resources.

Rare visitors

A cattle egret (Bubulcus ibis) and a white stork (Ciconia ciconia) were two anomalous visitors to the South African sub-Antarctic weather station on Maron Island this year. The island, 2300km south-south-east of Cape Town, is the breeding ground of 26 species of sea birds, and has an estimated Macaroni penguin population of 2,000,000.

ANARE BEGINS

Restoration of Mawson's Cape Denison hut

Preliminary marine research studies of the Southern Ocean will be carried out along the ship tracks of the Nella Dan during her relief voyages to Australia's Antarctic and sub-Antarctic stations this season. The Nella Dan sailed from Melbourne for Macquarie Island last month on the first of the four annual Australian National Antarctic Research Expeditions (ANARE) and was expected to return on November 26.

Marine research is expected to become increasingly important in future Australian Antarctic scientific programmes. This season Antarctic Division scientists working from the Nella Dan will study the distribution of phytoplankton, which is the basic food of marine life. Complementing this research is the work of the Division of Fisheries and Oceanography, Commonwealth Scientific and Industrial Research Organisation, which will continue measurements of the chemistry and temperature of the sea water throughout the voyages south.

On the Nella Dan's first voyage the expedition was led by Mr Attila Vrana, of the Antarctic Division, and the ship carried 19 members of the 1978 Macquarie Island winter party, which will continue research in meteorology, upper atmosphere physics, geophysics, and biology. The officer-in-charge is Mr P. Pritchard, of Melbourne. Ms Enid Borschmann, of Mildura, Victoria, accompanied the expedition as a cook. This continues the recent practice of including women in the Marquarie Island winter party. The station doctor and one of the radio operators last winter were women.

Other passengers on the Nella Dan included scientists from universities, the C.S.I.R.O., the Tasmanian National Parks and Wildlife Services, and other Australian institutions. They were to undertake a number of studies during the relief operations and this summer. One party of four biologists from the Australian Museum, Sydney, will stay at Macquarie Island until February to make surveys of marine and terrestrial fauna and flora.

Later this season the Antarctic Division will initiate a long-term programme of restoration and preservation of the main hut at Cape Denison, Commonwealth Bay, erected by Sir Douglas Mawson's Australasian Antarctic Expedition of 1911-14. A party of four men will leave Melbourne on January 12 aboard the Thala Dan, and will remain at Cape Denison for a month to make a thorough appraisal of the base and the four huts.

Since 1974 three visits of a few hours duration have been made by ANARE staff to Cape Denison, and only "first aid" maintenance has been possible. But these visits have revealed the need to clear the ice which fills most of the interior of the main hut and encapsulates the remaining contents. The structure of the hut is still substantially complete, although much of the fabric is in various stages of decomposition.

During their stay at Cape Denison members of the restoration team will live in tents on a ration pack diet. Their main objectives will be removal of ice and snow from the main living hut, preventing of further ingress of snow, and assessment of the structure for future restoration work.

Glaciologists to meet at Dome C

Dome C, the ice dome in Wilkes Land 1150 from McMurdo Station, will be a meeting place for scientists of five nations this summer — Australia, France, the United Kingdom, the United States, and the Soviet Union. They are taking part in the International Antarctic Glaciological Project, which is a joint study of a large part of the East Antarctic ice sheet. The Dome C region is one of the major centres of ice out-flow in East Antarctica, and is an area of great glaciological interest.

This season a French team led by Dr Claude Lorius has resumed studies at Dome C, which contains some of the world's thickest known ice. The team plans to drill into the ice to a depth of 1000m. Cores from the drill hole will help to describe climatic changes over the last 25,000 years, to determine the origin of chemical impurities, and to study the stability of the East Antarctic ice sheet.

Another French team worked for several weeks at the Amundsen-Scott South Pole Station to complete a geochemical study of snow and ice samples started in the 1974-75 season. They dug shallow pits near the Pole, and took samples of snow accumulated there over the last 15 years. This will aid investigations of aerosol and other chemical constituents of Antarctic snow.

More than 30 tons of supplies and equipment for the drilling team at Dome C was flown from McMurdo Station by United States Navy Hercules aircraft of VXE-6 Squadron. Members of the French team followed after several days acclimatisation at the South Pole to prepare for working at Dome C, which is more than 3352m above sea level. The Frenchmen are using the Dome C camp established by the United States naval support force for the recovery of the three Hercules aircraft damaged when supporting French research in the 1975-76 season.

RUSSIAN PLANS

Early next year the 23rd Soviet Antarctic Expeditions plans to send a traverse party along the route from Mirny to Pioneerskaya, and then to Dome C. This will be party of the Soviet Union's contribution to the International Antarctic Glaciological Project, and the International Magnetospheric Study. Last season the Russians made a major magnetic and glaciological traverse inland from Mirny between January 16 and March 9. They covered 2200km in 52 days, and reached a point 300km from Dome C.

On their traverse the Soviet scientists established automatic magnetic stations and made studies of snow accumulation, density, and hardness along the route. A glaciologist from the Australian Antarctic Division took part in the traverse with a Doppler satellite receiver, and established markers for use in studies of the movement of the East Antarctic ice cap. Two Australian scientists are expected to take part in thsi season's traverse to Dome C.

British scientists from the Scott Polar Research Institute will continue their glaciological and geophysical exploration of the Antarctic ice sheet by airborne radio-echo sounding, which they have done for several seasons. The sounding, which is part of the International

Antarctic Glaciological Project, is done from a specially-equipped United States Navy Hercules aircraft in co-operation with American investigators and staff from the Technical University of Denmark.

In past seasons the airborne exploration of the ice sheet, based on McMurdo Station, has covered a vast area of East Antarctica, and has also taken in part of West Antarctica. This season the specially-equipped Hercules is being used to make a survey of Dome C for selection of the most suitable drilling site by the French glaciologists.

PLANE RECOVERY

United States and French co-operation in East Antarctica will extend this season to aircraft recovery. A French traverse team will build a skiway in Wilkes Land at 68deg 20min S/137deg 31min E where a United States Navy Hercules was disabled and abandoned after an accident on December 4, 1971. The aircraft was disabled after resupplying a French traverse about 225km inland from Dumont d'Urville.

To enable United States Navy and civilian aviation experts to visit the site and decide whether it is feasible to recover the aircraft the winter team at Dumont d'Urville constructed a skiway a few kilometres from the station. Early this month a French support team was flown from McMurdo Station to the site — a distance of about 1482km. Then the team, led by Roger Guillard, who was in charge at Dumont d'Urville last winter, began the 230km journey from the small inland base of Carrefour towards D259, site of the abandoned Hercules, where a second skiway will be built.

When the skiway is completed experts will fly in from McMurdo Station to make a technical review of the present condition of the aircraft, which is partially-buried, but accordingly to earlier French reconnaissance reports, virtually free of snow inside the fuselage. If the inspection shows that the aircraft can be recovered, the support force will make the effort in the 1978-79 season.

Historic document restored

An historic document which remained buried under rocks in the Antarctic for 46 years has been restored at the Australian National Library in Canberra. It is the proclamation of British sovereignty over King George V Land, now part of Australian Antarctic territory.

On the second voyage of the British, Australian, and New Zealand Antarctic Research Expedition led by Sir Douglas Mawson the Discovery anchored off Cape Denison, the main base of the Australasian Antarctic Expedition (1911-14). A landing was made, and the Australian flag was hoisted at noon on January 5, 1931. In a casket at the foot of the flagpole was deposited a proclamation which claimed formal possession of King George V Land — as situated between 142deg and 160deg E, and between 66 deg S and the South Pole.

Two New Zealanders were present on the historic occasion when Sir Douglas Mawson read the proclamation. They were two young scientists, R. A. Falla (ornithologist), now Sir Robert Falla, and R. G. Simmers (meteorologist) now Dr Simmers.

When members of the Australian National Antarctic Research Expeditions visited Cape Denison in January, 1974, they found the original proclamation still in place. It had been buried under rocks in a canister made from three tins, which had become heavily corroded, and produced rust stains on the document.

When the proclamation was brought back to Australia the rust stains were removed, and it was placed in the National Library's manuscript section. A facsimile will be returned to the original site when an A.N.A.R.E. party visits Cape Denison again.

B.A.S. REPORTS

Marine Research Project in Scotia Sea Area

British Antarctic Survey scientists aboard the Royal Research Ship John Biscoe will begin a new programme of marine research this summer, which is likely to be continued for a numberof years. For about two months an intensive study will be made of the marine environment and ecosystem in a small area of high productivity in the Scotia Sea south of South Georgia.

An extensive programme of geochemical sampling throughout the Antarctic Peninsula will be carried out from late February by field parties supported by the R.R.S. Bransfield and aircraft. The purpose is to determine the evolution of the igneous rocks which form the greater part of the peninsula. Geologists from the University of Birmingham will collaborate with the British Antarctic Survey in the project, and also in an investigation of the geochronology and palaeomagnetism of the major intrusions.

When the John Biscoe sailed from Southampton at the end of September she began her 21st Antarctic season. Next year she will undergo a major refit.

FERRY FLIGHTS

After calls at Montevideo and the Falkland Islands the John Biscoe proceeded to Damoy Point, Wiencke Island. On October 27 she landed there 15 men and stores. They were geologist, glaciologists, and geophysicists who will spent two or three months at field sites in Palmer Land and on Alexander Island, using motor toboggans for transport.

Because access to Rothera by sea was blocked by ice this party was flown south from the Damoy Point air facility by the two B.A.S. Twin-Otters, which had made a six-day flight to Rothera from Toronto. One aircraft is new. It replaces the Twin-Otter which was damaged beyond repair on January 22 during field operations south of King George VI Sound.

Two men were left in charge of the Damoy Point refuge hut, and remained there until the ferrying flights were completed. The John Biscoe was to have proceeded to South Georgia to land a party of biologists who will be working on and around the island. But the work was postponed while Mr Giles Kershaw, a pilot on short-term loan to B.A.S., who joined the ship at Damoy Point, inspected the old runway at Deception Island, and then was taken to Punta Delgada, Chile, to fly home.

Then the John Biscoe sailed for South Georgia, collecting passengers from the Falklands en route. After establishing parties of biologists on Bird Island and elsewhere, she remained in the South Georgia area for several weeks, relieving Grytviken Station, and the field huts, and assisting the biologists. Then she was to relieve Signy before returning to South America to pick up more men, including the co-master, from Mar del Plata on December 26.

KRILL STUDIES

In the marine research programme this summer supplementary studies of the biochemistry of krill and the relationship between krill and its predators — fish, seals and birds — will be based on the B.A.S. laboratories at Grytviken. This programme is regarded as of particular importance because of the

rapidly increasing interest in the potential food resources of the Southern Ocean.

As krill is the key organism in the food-web that forms the basis of Southern Ocean ecology, it is vital that its role should be fully understood before large-scale exploitation is undertaken. Mismanagement of krill or fish stocks could endanger many species of whales, seals, birds and other animals.

The B.A.S. programme will contribute to the international BIOMASS (Biological Investigation of the Marine Antarctic System and Stocks) programme. This is promoted jointly by the Scientific Committee for Antarctic Research and the Scientific Committee on Oceanic Research.

SUPPLY VOYAGE

R.R.S. Bransfield left Southampton on October 21 with 32 passengers on board. Her first port of call was Mayport, Florida, where cargo was picked up for Palmer Station. She then passed through the Panama Canal and proceeded to Valparaiso to embark senior B.A.S. staff going south for the summer and nine Americans going to Palmer Station.

Her primary task is to supply the five main B.A.S. stations and Palmer Station and, as usual, she will also assist field parties. An attempt will be made to reach Palmer Sttion and Faraday (Argentine Islands) in the middle of this month and if ice conditions permit, the ship will then continue down the west coast of the Antarctic Peninsula to deliver building supplies to Rothera.

GEOPHYSICS PROJECT

From Rothera the Bransfield will return to the Falklands to refuel and take on more men before sailing for Halley Station by way of South Georgia. The relief of Halley is always unpredictable. For several seasons it was an extremely difficult and lenghty operation, but in the last two years, by following leads on the east side of the Weddell Sea, the ship was able to go in early and unload on to fast ice and snow ramps near the station before they broke out from the base of the ice cliffs.

A speedy relief of Halley will allow more time for ship-borne geophysics in the northern part of the Weddell Sea. This will be undertaken by the Marine Geophysics Group of the University of Birmingham which has worked in the Scotia Sea and surrounding areas contineously since 1959-60. It is hoped that this season's work will help to elucidate the structural relationship between East and West Antarctica and also date the formation of the Weddell Sea floor.

MAIN RELIEF

The ship will then call at Signy Island and revisit South Georgia before turning north to Mar del Plata, Argentina, where the ship's co-master will take over command, and more senior B.A.S. staff will be picked up. She will then return to the west coast of the Antarctic Peninsula to carry out the main relief of Rothera.

The third and final phrase of the construction of Rothera should be completed this season. This includes the addition of one new building, more fuel tanks, an evaporating plant and a jetty, and the conversion of the original all-purpose building into a dormitory block. Two mobile huts will also be provided for the airstrip. Interior work has been continued throughout the winter.

NEW PROGRAMME

From late February onwards, field parties supported by the Bransfield and aircraft will carry out an extensive programme of geochemical sampling throughout the Antarctic Peninsula. The purpose is to determine the evolution of the igneous rocks which form the greater part of the peninsula. This will be supplemented by an investigation into the geochronology and palaeomagnetism of the major intrusions. Geologists from the University of Birmingham will be collaborating with B.A.S. in these projects.

In mid-March the Bransfield will

leave the Antarctic Peninsula area, calling at various stations on the way, including the Argentine Almirante Brown station where ionospheric equipment for the present B.A.S.—Argentine—U.S. project will be inspected.

Medical emergency flight to Argentine base

A British Antarctic Survey pilot flew more than 3000km last month to bring out a sick man from the Argentine base, General Belgrano, on the Luitpold Coast of Coats Land. The pilot, Giles Kershaw, was at the controls of the B.A.S. Twin-Otter for 16 hours on the flight from Rothera to General Belgrano, and then to the Argentine Air Force base, Marambio, on Seymour Island. Available Argentine aircraft could not fly in because they were not ski-equipped.

After an urgent request from the Argentine authorities, one of the two B.A.S. Twin-Otters based at Rothera, with a mechanic and the base doctor, left Adelaide Island in the late afternoon of November 1. It flew more than 1350km across the Antarctic Peninsula, and then over the Ronne and Filchner Ice Shelves to General Belgrano. The Argentine base, established on the Filchner Ice Shelf 20 years ago, is now located on the Bertrab Nunatak, between Shackleton, the 1956-57 base of the Commonwealth Trans-Antarctic Expedition, and Vahsel Bay.

To bring the sick man, suffering from a severe internal haemorrhage, to Marambio Mr Kershaw had to fly the Twin-Otter more than 1100km. The flight was followed from the United States base, Palmer Station, on Anvers Island, and hourly weather reports from Marambio and alternates were translated from Spanish for the crew of the Twin-Otter, which delivered the sick man on the morning of November 2 just as bad weather closed in over the whole Antarctic Peninsula and grounded all aircraft.

As soon as the weather cleared the sick man was flown from Marambio to hospital in Buenos Aires by an Argentine Hercules aircraft. Because Rothera and all other destinations were closed in, Mr Kershaw had to fly from Marambio to Palmer Station on November 3. While they waited for the weather to clear the crew of the Twin-Otter helped the winter team at Palmer Station to pack material for return to the United States when the summer team arrives.

Mr Kershaw, who was on short-term loan to B.A.S. from Taylor Woodrow International Ltd., was also in the news last January when he flew more than 2500km across the Antarctic to rescue 6 B.A.S. men marooned south of Alexander Island after their aircraft had crash-landed.

Before the B.A.S. Twin-Otter made its mercy flight an Argentine Twin-Otter on its way to Marambio was delayed at Palmer Station because of a defective overspeed engine governor. An Argentine Air Force Hercules dropped a spare governor by parachute on the evening of October 30.

A mail package was attached to the parachute, and soon after the air drop the crew of the Twin-Otter and the 10 men at the station were contentedly munching large amounts of English licorice sweets. The sweets were sent by the parents of Edward C. Schwalenberg, of the University of Nevada, who has been the station meteorologist this winter.

On October 31 the Argentine crew installed the spare governor in their aircraft which left Palmer Station the next afternoon. The Twin-Otter landed later at Marambio without incident.

Expedition will attempt Smith Island peaks

Three ice-capped peaks on Smith Island in the South Shetlands will be attempted by a British mountaineering expedition this summer. Two New Zealanders, one with Antarctic climbing experience, have joined the expedition which is led by the noted mountaineer, navigator, and author, Major H. W. Tilman.

Major Tilman, now 78, was the leader of the 1938 Everest expedition. In 1964-65 he sailed the 19.2m schooner Patanela 3862km to Heard Island with the members of the Southern Indian Ocean expedition led by Major Warwick Deacock, which climbed 2743m Big Ben. This time he will not do any climbing, but will sail a converted 18.8m steel-hulled trawler from the Falkland Islands to Smith Island.

Landing on the rugged coast of Smith Island, whose sheer black cliffs rise 609m to 914m is likely to be almost as hazardous as scaling its peaks. To the west the coast slopes gently, but elsewhere the island rises sheer from the water line, and the whole north coast is fronted by breakers extending 3.2km offshore.

Smith Island lies about 67.5km westward of Deception Island (62deg 55min S/62deg 29min W) and is about 28.9 km long and 13.14km wide. Two of its ice-capped peaks which can be seen from a great distance are the southern Mt Foster (2103) and Mt Pisgah (1859m) 6.4km north-eastward. About 4.8km north-eastward of Mt Pisgah is Mt Cristi (1280m).

Because of its great height and striking appearance Smith Island has been a landfall for ships approaching Bransfield Strait which runs between the South Shetlands and the coast of Graham Land. It is named after Captain William Smith, master of the brig Williams, who discovered the South Shetlands in February, 1819, by accident on a voyage from Montevideo to Valparaiso.

Smith sighted Smith Island on his third Antarctic voyage in October, 1819. It was known to British and American sealers from 1820 onwards, and the only recorded landing was by Captain John Davis on February 1, 1821, during an American sealing expedition. He landed on the southern coast to find that Australian sealers from Botany Bay had already established a camp there.

One of the two New Zealanders in this year's mountaineering expedition is Gary Ball, a professional guide from Mt Cook. He was an Antarctic Division field assistant in the 1976-77 season, and climbed five peaks in the Royal Society Range with Walter Bonatti, the noted mountaineer and alpine guide with the Italian expedition to the Ross Dependency. In 1973 he spent several months climbing in South America with a New Zealand party.

The other New Zealander is David Kilcullen, a farmer from Karamea, who has climbed extensively in Peru. In 1973 he was a member of the New Zealand party which made the sixth ascent of the west ridge of Pumasillo (6075m) in the Cordillera Vilcabamba of central Peru. The actual ascent was made by Mike Andrews and Kevin Carroll.

In November of the same year Kevin Carroll and David Kilcullen joined two Americans, Jeff Salz and Steven McAndrew in an attempt to make the fifth ascent of Cerro Fitzroy (3360m) a sheer tower of windswept rock in Argentinian Patagonia. Only 200m from the summit Carrol and McAndrew were caught in a fierce storm on the west face of the peak and swept to their deaths by dislodged rocks.

SUB-ANTARCTIC

CONTROL OF WILD CATS ON MARION ISLAND

Wild cats on Marion Island are believed to kill between 50,000 and 60,000 petrels each year. The remote sub-Antarctic island, where South Africa has had a weather station since 1949, is the breeding ground of 26 species of seabirds. Cats (Felis domesticus) and mice (Mus musculus) are the only introduced mammals.

Mice were probably introduced through shipwrecks and sealing expeditions. In 1949 five cats were taken to the island to combat the mice problem in the meteorological station. Since then the cats have gone wild, and the population on the coastal plains all round the island has grown to an estimated 3000. Petrels make up the bulk of the wild cats' diet; mice comprise only a small portion although large numbers are distributed over the island.

To check the alarming reduction of the bird population biologists from the Mammal Research Institute of the University of Pretoria have begun a programme to eradicate the cat population of the island by the introduction of the feline pan-leucopenia virus which affects only cats. As part of the institute's mammal research programme two biologists, R. J. Van Aarde and P. Condy have investigated for some time the basic ecological relationships of the feral house cat population.

VIRUS SPREAD

Between April last year and March this year carrier cats were trapped to spread the virus. In other parts of the world cats have developed resistance to the virus; up to now it has not reached Marion Island. The carrier cats were released over different parts of the island in March, using a Puma helicopter from the S.A.S. Protea.

Other projects in the mammal research programme this year include the regular census and tagging of two species of fur seal, Arctocephalis tropicalis and Arctocephalis gazella; and elephant seals (Mirounga leonina). Some ecological aspects of the introduced mice population are being studied, and a record is also kept of sightings of killer whales. This programme is being run by H. Erasmus, of the University of Pretoria.

In August the biologists sighted a Southern Right Whale (Balaena glacialis australis). It apeared off the island on August 19, 24, and 29. On two separate occasions team members dived to within metres of the whale and obtained an excellent photographic record.

NITROGEN CYCLING

There are 14 men in the 33rd relief team on Marion Island, and all are involved in microbiological, meteorological, and ionospheric programmes. Some are scientists; the others assist them or provide the logistic support needed to keep the base running.

A study of nitrogen cycling is being made by the microbiologist, Dr H. A. Lindeboom, originally from Groningen, Holland, and now attached to the Institute of Environmental Science, University of the Orange Free State. This project is part of a larger programme initiated to investigate the bio-energetics and mineral cycling of the ecosystem of the island.

Marion Island has a deficiency of

nitrogen and phosphorus as growing factors. The phosphorus is introduced by both salt spray and animals, whilst the nitrogen is primarily introduced by animals. In the present study some chemical and microbiological factors of nitrogen cycling are being investigated.

Starting with the number of sea-going animals (penguins, elephant seals, and wandering albatrosses) and the amount of excretion products they produce, the cycle is followed as these products are used by micro-organisms as energy and mineral sources. A small amount of the nitrogen is used by plants, and most of it is returned to the sea, the starting point of the cycle.

Complementary to the main project of counting penguins, and micro-organisms, scraping faeces and making hundreds of chemical analysis, minor investigations have been done on nitrogen fixation by blue green algae, and on the flowering of and the enzymes in plants. Pollen traps have been erected at four different sites in the hope of capturing pollen and spores, which would indicate longdistance dispersal.

GLACIAL HISTORY

Between 100,000 and 15,000 years ago Marion Island was covered by extensive glaciers. The glacial history of the island, and the effects of the last ice age, are being studied by a British glaciologist, Kevin Hall, who is attached to the Institute for Environmental Sciences, University of Orange Free State.

Results so far have indicated two glacial episodes with an intervening interglacial during which a palaeosoil developed. Evidence for the oldest glaciation shows at least one interstade while the youngest glaciation can be shown to have experienced at least four stades. By a combination of stratrigraphy, till fabric analysis, striation date and moraine locations, the palaeo distribution and oscillations of the glaciers through the last glacial have been delineated.

Preliminary analysis of inferred palaeo temperatures suggests an annual mean temperature of some 3deg Celsius lower than present. Additional investigations have determined two former sea levels (3m and 6m) and periglacial studies have produced interesting data on sorted stripes.

The results from Marion Island are considered to be quite pertinent for the understanding of the quaternary history of the Southern Hemisphere, as the Marion glacial sequence adds important new data for the sub-Antarctic area.

WEATHER PROGRAMMES

The 24hour daily meteorological programme is run by four meteorologists, three of them have had previous island experience, two on Gough island and one on Marion.

The upper air system is based on Vaisala 1680Mhz sondes and a 440Mhz transponder ranging system with two soundings a day. The old pressure-cooker type aluminium hydroxide generator has been replaced by a Stuart electrolytic generator plant, which has greatly improved working conditions.

All main and intermediate synoptic observations are conducted as well as hourly surface observations between 0600 G.M.T. and 1200 G.M.T.

The meteorological staff operates on a shift system, which allows ample opportunity for field excursions. Meteorologists are G. J. Luden (senior, ex-Gough), V. L. Trollip (ex-Gough), C. J. Grove (ex-Marion) and P. Schoeman.

For the ionospheric and geomagnetic programmes, the N.I.T.R. developed a 30m aluminium mast which was set up in 1974 to combat high winds. It is still proving highly succesful. The proton procession recording magnetometer, designed and manufactured at the magnetic observatory of the C.S.I.R., and installed in April this year, is producing results of high accuracy, chart recordings being obtained every second. The present ionosphericist is C. J. W. Erasmus.

SANAE REPORT

South African team's busy winter

Although no earth sciences programme was carried out from Sanae this year — it will be resumed next year — the 16 men of the 18th South African National Antarctic Expedition (SANAE 18) led by Gideon le Roux have had a busy winter, occupied by programmes of geomagnetics, ionospheric research, magnetospherics, and cosmic ray and riometer experiments. After more than 11 months' isolation in Queen Maud Land the men of the winter team are eagerly awaiting their relief by the supply ship RSA early next month.

During the relief last January SANAE 18 had a shocking introduction to the hazards of the Antarctic just before the supply ship RSA sailed for Cape Town. The meteorological hydrogen generator exploded, and a member of the new meteorological team was badly burned about the face and eyes.

After the RSA departed the new team settled down quickly to prepare for the winter, checking instruments for the scientific programme, packing stores unloaded from the ship, and becoming familiar with details of the work ahead. Because of bad weather and the steadily shortening days the team had to rush to complete all the outside work before settling in for the winter. During this period three different groups went down to the coast. They sighted very few penguins or seals, however, and the wouldbe photographers returned dis appointed.

FOUR PROGRAMMES

Three of the four scientific programmes have been conducted by the University of Natal, Rhodes University of Grahamstown, and Potchefstroom University. The geomagnetics programme has been controlled by the Geomagnetic Observatory in Hermanus.

Four experiments in magnetospherics make up the University of Natal programme.

The groundbased VLF receivers, which have been operated routinely for some years, again formed the main source of data during the IMS co-ordinated period. New impetus has been added by the integration of a direction-finder this winter. The satellite system provides VLF data from the experiment aboard the Isis I and two satellites. This data is particularly useful when augmented by the groundbased data.

The geomagnetic micropulsations experiments has also been running continuously, but the digital paper punches went on a strike so that data was limited to a continuous chart record. The low-light-level television system for recording auroral morphology was fitted with a new 90degree lens, but much to the frustration of the operators, there have hardly been any auroral displays at all.

In 1978 the programme will be expanded to include three new experiments on atmospheric electricity. A field mill will measure the variations in the static electrical field, and a VLF system with integrated spheric receivers at 5 and 27 kHz will be installed, as well as an ELF system with a horizontal loop antenna to provide a record of integrated ELF activity.

SNOW STATIC

The ionospheric research programme, run by Rhodes University of Grahamstown, has been run continuously with very few interruptions. Those that actually occurred, were mostly caused by minor faults and snow static which builds up during storms.

Soundings, i.e. vertical and oblique, are made alternately at 15 minute intervals, and once a week a calibration is done between Sanae and Grahamstown. It is envisaged that a more powerful transmitter will be installed at Sanae to enable the generated signal to reach Grahamstown by a single hop instead of a double hop as is the case at present.

The airglow experiment, which measures airglow intensity at three different frequencies, was run during the dark months. Very satisfactory results were obtained.

The cosmic ray and riometer experiments are run under the auspices of Potchefstroom University. The neutron monitor aboard the RSA broke down on the way to Sanae and little data was procured. The monitor at Sanae, however proved most trustworthy and reliable data has been collected during the year. The riometers, being such incredibly sensitive receivers, have given endless problems caused by interferences of all kinds.

BALLOON FLIGHTS

The balloon package experiment has been quite successful after numerous problems of an electronic nature were solved, both in the packages and signlas analyser. Four flights have been attempted so far, and some more are being planned for the summer under more favourable weather conditions.

To ease the analysing of the cosmic ray data, a computer will be installed, probably in 1979. This will delight operators who have to do everything manually at present.

Once again the apparatus was made functional again, standard observations and measurements of magnetic fluctuations were continued as part of the geomagnetics programme controlled by the geomagnetic observatory in Hermanus. Another attempt was made this year to procure (or is it obscure?) some H-Beta auroral data with the aid of a photometer, but the sensitivity of this instrument leaves much to be desired and no data was collected as a result.

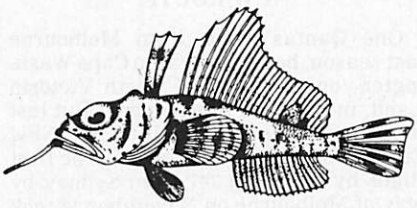
Sanae's old seismograph again showed itself to be the most reliable system in action. It has regularly contributed its share to the measurement of the world's great earthquake shocks.

FIELD TRIPS

Because there has been no geological programme this year the vehicles at Sanae have seen little service. But the will be used in a run to the continent later this summer to enable members of the team to see the mountains south of the base.

After the field trips it is expected that an evaluation will be made of an experiment on lubricants which is being conducted at the base. The experimental vehicle fitted with a V8 diesel engine has done very little work but it is a vast improvement on the previous model.

Since the return of the sun the SANAE 18 has been able to do a lot of work outside in between heavy storms. Vehicles have been dug out of the winter snow, stores platforms have been lifted, huts and antennas have been raised, and drums of diesel fuel dug up for use. Slowly but surely Sanae is being prepared to receive men of SANAE 19.



TOURISM

Day trips and cruises to Antarctic

Tourism has become almost an Antarctic growth industry this year. Between October and December more than 2000 Australians, New Zealanders, and Japanese, have seen the continent from the air as passengers on day trips made by the aircraft of two international airlines — Qantas and Air New Zealand. Another 500 to 600 tourists will cruise in the Antarctic Peninsula area, making calls at American, British, Russian, and Argentinian bases, and 1250 passengers aboard an Italian cruise liner will be in Antarctic waters next month.

Last summer Air New Zealand and Qantas provided five trips for more than 1200 day tourists. These flights were made on special charters or by arrangement with travel firms. Qantas flights this summer are all special charters; Air New Zealand flights have been run entirely by the airline.

All Air New Zealand's flights have been to the Ross Dependency, and the McMurdo Sound area where the tourist attractions are Mt Erebus, one of Antarctica's two active volcanoes, the historic huts of Scott and Shackleton on Ross Island, and the New Zealand and American bases there, and the strange dry valleys of Victoria Land. Qantas flights have been to the South Magnetic Pole, which is only a point in the ocean opposite the French base, Dumont d' Urville, in Adelie Land.

NEW ROUTE

One Qantas flight from Melbourne last season, however, was to Cape Washington, on the coast of North Victoria Land, in the Ross Dependency. But last month Qantas moved into Air New Zealand's sphere of influence. The first flight by a Boeing 747 from Sydney by way of Melbourne on November 17 took 300 passengers into McMurdo Sound and over Mt Erebus. This flight, under charter to the electronics firm run by Mr Dick Smith, who organised the first day trips last year, was planned to reach the South Pole, but because of strong winds the 747 flew from McMurdo Sound to Dumont d'Urville and over the South Magnetic Pole.

A third 747 flight from Melbourne on November 24 under charter to a city travel firm, also flew to McMurdo Sound, and then to Dumont d'Urville. On November 23 a Boeing 707 charter flight organised by an Adelaide travel firm took 170 passengers south over Macquarie Island, the Australian base, Casey, on the Budd Coast of Wilkes Land, and Dumont d'Urville. The flight began and ended in Adelaide.

NOSTALGIC FLIGHT

A notable event in Australian and New Zealand Antarctic history was recalled on the flight from Sydney to the South Magnetic Pole on December 1. The special guest on board the 747 was an 88-year-old New Zealander, Mr Eric N. Webb, the last survivor of Mawson's Australasian Antarctic Expedition (1911-14), who with two Australians, Bob Bage and Frank Hurley, came within 80km of the South Magnetic Pole on December 21, 1912.

Sixty-five years ago Bage, Webb, chief magnetician of the expedition, and Hurley, man-hauled their sledges 482km south from the main base at Cape Denison in Commonwealth Bay in driving blizzards and temperatures below zero. They made their last camp at 89deg 35 min S. Three years before three members of Shackleton's expedition, Mawson, Edgeworth David, and Mackay, had man-hauled their sledges 2027km to establish the position of the Magnetic Pole on the Victoria Land plateau at 72deg 25 min S.

Between 1909 and 1912 the shifting Magnetic Pole had moved 281km from where Shackleton's men had located it. Over the last 65 years it has continued to move further north towards the coast. From Victoria Land the movement was across the Ninnis Glacier towards the coast of King George V Land and Commonwealth Bay. In 1960 it was located near Cape Denison, and five years later it was off the coast of Adelie Land. When Eric Webb made his second journey to the Magnetic Pole its approximate position was at sea near the French base, Dumont d'Urville.

FIRST TRIPS

Air New Zealand began its first day trips, classed as domestic flights from Auckland to Christchurch by way of Antarctic, on October 18. It used four different DC10 aircraft of its fleet, flown by Captains M. Hawkins (October 18), A. W. Jones (November 1), R. Johnson (November 8) and A. Vette (November 15).

Each flight left Auckland with a maximum fuel load of 109,000kg, the aircraft being required to have 51,000kg remaining when leaving McMurdo Sound to meet all reserve and contingency requirements on the way home. They all landed at Christchurch with plenty of fuel to fly on to Auckland (the alternate) if necessary.

About 230 passengers travelled on each flight, and the aircraft carried three pilots, two flight engineers, and 15 cabin attendants. There were 105 Japanese tourists on the last two flights — 21 on November 8 and 84 on November 15 — as well as some Australians.

All the flights were favoured by good weather, and although cloud was encountered on some occasions, the DC10s did not have to use the alternative route along the coast of King George V Land to the South Magnetic Pole. Passengers on the November 1 flight had the best viewing — clear skies all the way south and back. Each aircraft flew about 8851km between Auckland, McMurdo Sound, and Christchurch.

MORE CRUISES

Tourists travel in Antarctic waters is more expensive, and takes longer, but Lindblad Travel, which has organised tourist cruises to the Antarctic Peninsula and Ross Sea areas since 1965, still attracts tourists every season. The Lindblad Explorer, built for the company in 1969, made three cruises to Antarctic Peninsula waters last season; four are planned between December 19 and March 8 this season.

As in past seasons the cruises will be started from Ushuaia, and include the Falkland Islands (Islas Malvinas), and visits to various bases. Calls will be made at Hope Bay, King George and Deception Islands, Port Lockroy, Anvers Island, the Argentine Islands, and Paradise Bay.

In 1968 Lindblad Travel organised the first tourist cruises to the Ross Sea area, using the Danish polar ship Magga Dan. The Lindblad Explorer made two cruises in the 1970-71 season, and returned to McMurdo Sound in the 1973-74 season on her way to the Antarctic Peninsula.

Next season the Lindblad Explorer will make three Antarctic cruises, tha last of which will include the Ross Sea area. After visiting the Antarctic Peninsula, the ship will cruise along the Antarctic coast and the Ross Ice Shelf to McMurdo Sound, arriving there about February 6, 1979. On the way to Bluff calls will be made, subject to ice conditions and weather, at Cape Hallett, Cape

Adare, the Balleny Islands, Macquarie Island, Campbell Island, and the Auckland Islands.

NEW SHIP

A West German travel firm, Neckermann und Reisen GmbH, plans two Antarctic "educational" expeditions between December 14 and January 28 this season. It will use the 3,153-tonne motor-ship World Discoverer, which can carry 120 passengers. Most of the tourists are expected to be West Germans.

Scientists with Antarctic experience will travel on each voyage. They will brief the tourists and accompany them on proposed visits to bases in the Antarctic Peninsula area. The cruises will begin and end at Ushuaia, and will include visits to the Falkland Islands (Islas Malvinas).

Subject to the base commanders' approval the World Discoverer will call at Bellingshausen Station on King George Island, Esperanza in Hope Bay, Palmer Station on Anvers Island, Faraday Station (Argentine Islands), and Almirante Brown Station in Paradise Bay. The ship will also cross the Antarctic Circle if ice conditions are favourable, and call at Deception Island.

An Italian cruise liner, the 13,607-tonne Enrico C. will take up to 1250 passengers into Antarctic waters in January next year. The Costa Line's cruise starts at Montevideo and carries on to Ushuaia, Cape Horn, Antarctic waters, the Falkland Islands, and finally Buenos Aires. Publicity material suggests that visits will be made to Antarctic Peninsula base, but these are not named.

Fuji's satellite equipment

Tests of telephone and telex communications, using the MARISAT Pacific and Atlantic satellites, are being made aboard the icebreaker Fuji during her voyage south for the 19th Japanese Antarctic Research Expedition (JARE 19). Beacon waves from the third MARISAT over the Indian Ocean will also be observed as long as time permits on the voyage. MARISAT mobile terminal equipment has been installed on the Fuji, which sailed from Tokyo on November 25, and will complete this season's voyage on April 20.

Among the proposed tests of the MARASAT equipment will be a check of any faults in the instrumental or operational points of the system, particularly in the storm zone around Antarctica, and of the lowest elevation and workable temperature at which the antenna unit can be used. Other features in the specifications will also be tested.

Installed by the Japan Radio Co., Ltd, the equipment is above and below deck. Above deck is the parabolic antenna, which is 1.2m in diameter. It is protected by a radome 1.8m in diameter and 30m high. The total weight of the above deck equipment, designed to operate on temperatures of minus 40deg to 65deg Celsius, is not more than 200kg.

Below deck equipment weighs approximately 310kg. It consists of a communication panel 5.7m wide, 6.30m deep, and 15.40m high, which weighs 250kg, and a teleprinter unit 5.64 wide, 4.75 deep, and 7.9m high, which weighs 60kg.

Two Frenchwomen will take part in the 27th French Antarctic Expedition this season, but they will be more than 1000km apart. A 28-year-old glaciologist, Martine Briat, flew this month from McMurdo Station to Dome C, the ice dome in Wilkes Land, where she will work in the glaciological research team led by Dr Claude Lorius until the end of January.

Off the coast of Adelie Land Christiane Gillet, who is a mechanical engineer, will work at the main French base, Dumont d'Urville, during the summer.

"Aurora Australis" sold for world record price

A world record price of $2400 was paid for a copy of "Aurora Australis," one of the rarest books about Antarctica, at an auction of rare books, prints, and maps in Wellington. "Aurora Australis" was set in type and printed at Cape Royds by Frank Wild and Ernest Joyce during Shackleton's 1907-09 expedition, and only 100 copies were produced.

This copy of "Aurora Australis" is signed by Shackleton, who was editor-in-chief, and George Marston, the expedition's artist, who was editor. It bears the bookplate of Annie Cowdray. The copy, which was the most expensive book ever sold at auction in New Zealand, will remain in the country.

Some copies of "Aurora Australis" were given to benefactors of the expedition, and it is presumed that each member of the expedition received a copy. There are at least four other copies in New Zealand — two in the Alexander Turnball Library, Wellington, one in the Canterbury Museum's polar library, and one owned by Mr P. J. Skellerup, chairman of the Museum Trust Board.

Since 1970 when the Canterbury Museum paid £450 for its copy at auction in London there have been two other copies of "Aurora Australis" sold at auction. One was sold for $950 in Melbourne in 1971, and the last recorded auction price was £740 paid in London on December 12, 1975.

FIRST EDITIONS

More than $3700 was realised from the sale of Antarctic and sub-Antarctic books at the auction, which was conducted by McArthur and Co. Among the books were Mawson's "The Home of the Blizzard," Shackleton's "The Heart of the Antarctic," and one of the 350 copies of the facsimile edition of the "South Polar Times." This was Volume III (June to October, 1911) edited by Cherry-Garrard. It was sold for $110.

"The Home of the Blizzard" in its original edition brought $120, and another copy $110. Roald Amundsen's account of his expedition also brought $110 for the two volumes, and "The Voyage of the Discovery" and "Scott's Last Expedition" were sold for $80 and $70 respectively.

Five books dealing with Shackleton's expeditions realised more than $200. "The Heart of the Antarctic" (1909 edition) brought $70, and $50 was paid for another two volumes with a typed letter dated February 4, 1914, on Imperial Trans-Antarctic Expedition notepaper and signed by Shackleton.

A 1920 reprint of "South", the story of Shackleton's 1914-17 expedition was sold for $20, and Frank Wild's story of the Quest expedition, "Shackleton's Last Voyage," brought $35. "Argonauts of the South" (1925) in which Frank Hurley wrote of his experiences with Mawson and Shackleton realised $60.

RARE PAMPHLET

Second highest price in the Antarctic expedition was $200 paid for a rare pamphlet by Charles Enderby published in 1849. Its title was: "The Auckland Islands: Short Account of Their Climate, Soil, and Products, and the Advantages of Establishing There A Settlement at Port Ross for carrying on the Southern Whale Fisheries with a Panoramic View of Port Ross, and a map of the Islands."

"The Sub-Antarctic Islands of New

Zealand" in two volumes, edited by Charles Chilton, and published in 1909, brought $55.

Bellingshausen's "The Voyage to the Antarctic Seas, 1819-21," translated from the Russian by Frank Debenham, and published by the Hakluyt Society in 1945, was sold for $76. The two volumes of Charles Wilkes's "Narrative of the U.S. Exploring Expedition during 1838 to 1842" brought $30. "Little America," the story of Byrd's first expedition, and "Discovery," the story of the second, were sold for $25 and $15 respectively.

Tucked away in the New Zealand section with J. H. Sorensen's "Wild Life in the Sub-Antarctic," and A. W. B. Powell's "The Shellfish of New Zealand," was a little booklet of less than 30 pages much prized by collectors of early Antarctic writings. It was "Antarctica," simply sub-titled "Leaves from a Diary kept on Board an Antarctic Exploring Vessel," the work of Charles Reginald Ford, who was ship's steward in the Discovery. Published in 1908 by Whitcombe and Tombs at 6d, it was sold with the other two books for $20.

THE READER WRITES

Sidelights of Antarctic Research

Hockey Sticks

Sir, — Scott's men did play hockey at Cape Evans 65 years ago; there appears to be no firm evidence that they ever played ice hockey.

A report in "Antarctic" (March, 1977, Page 10) suggested that Scott's men might have played ice hockey during their first summer at Cape Evans. This report described the finding of what was described as an ice hockey stick last summer by the New Zealand Antarctic Society's historic huts caretakers, Messrs. A. W. Burton and J. Sutton-Pratt.

But someone else seems to have christened the hockey stick an ice hockey stick. Messrs Burton and Sutton-Pratt did not coin the description. In their report in "Antarctic" (June, 1977, Page 48) they speak of finding a bandy stick 1m long (presumed to be a hockey stick) with the word Cheapside inscribed on it. A bandy stick is a curved stick.

Speculation began once the words ice hockey were applied to the stick and appeared in print. One suggestion was that as ice hockey is a peculiarly Canadian game, the owner of the stock was Sir Charles Wright, the young Canadian physicist with the expedition.

No other hockey or curved sticks appear to have been found previously, and most of the participants in games on the ice at Cape Evans are dead. But William Burton, one of the survivors of the crew of the Terra Nova, and father of one of the caretakers, provided a simple solution to the puzzle.

"Of course we played hockey, but not ice hockey," he told the writer when the question was raised. And he added that the sticks were useful for hitting seals over the head.

Like other Antarctic artefacts the hockey stick was probably left behind when the Terra Nova sailed from Cape Evans. The others must have vanished long ago.

Yours, etc.
"JAMES PIGG"

Since "James Pigg's" letter was received another correspondent has provided more information about games of hockey at Cape Evans. She is Miss P. F. Wright, daughter of Sir Charles Wright, who is working on her father's Antarctic diaries.

Miss Wright read the report of the ice hockey stick puzzle in the March issue, and she writes: "My father's diary for May 6, first winter: ...'Were to have had a game of hockey with a ball made of shellac and partly of paraffin wax. The first time I hit it it broke into three pieces.' That is the only mention of hockey, I believe."

"ANTARCTIC"

is published quarterly in March, June, September, and December. It is the only periodical in the world which gives regular up-to-date news of the Antarctic activities of all the nations at work in the far south. It has a world-wide circulation.

Yearly subscription NZ$4.50, Overseas NZ$5.50, includes postage (air mail postage extra), single copies $1.00. Details of back issues available, may be obtained from the Secretary, New Zealand Antarctic Society (Inc.), P.O. Box 1223, Christchurch, New Zealand. Back issues more than five years old are $1.50. Discount of 10 per cent for 20 or more copies.

Overseas subscribers are asked to ensure that their remittances are converted to New Zealand currency.

The New Zealand Antarctic Society (Inc.)

The New Zealand Antarctic Society was formed in 1933. It 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 has been involved in the establishment of a national Antarctic centre at the Canterbury Museum, Christchurch.

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

You are invited to become a member, South Island residents should write to the Canterbury secretary, North Islanders should write to the Wellington secretary, and overseas residents to the secretary of the New Zealand Society. For address, see below. The yearly membership fee is NZ$3.00 (or equivalent local currency). Membership fee, overseas and local, including "Antarctic", NZ$6.50.

New Zealand Secretary

P.O. Box 1223, Christchurch

Branch Secretaries

Canterbury: P.O. Box 404, Christchurch.
Wellington: P.O. Box 2110, Wellington.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