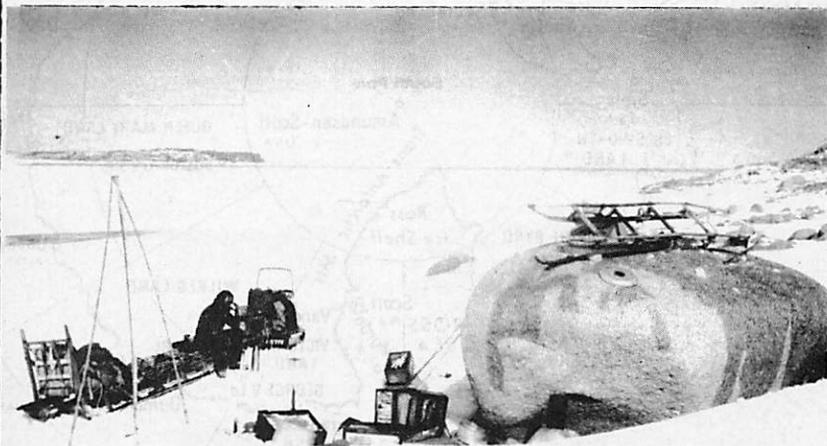


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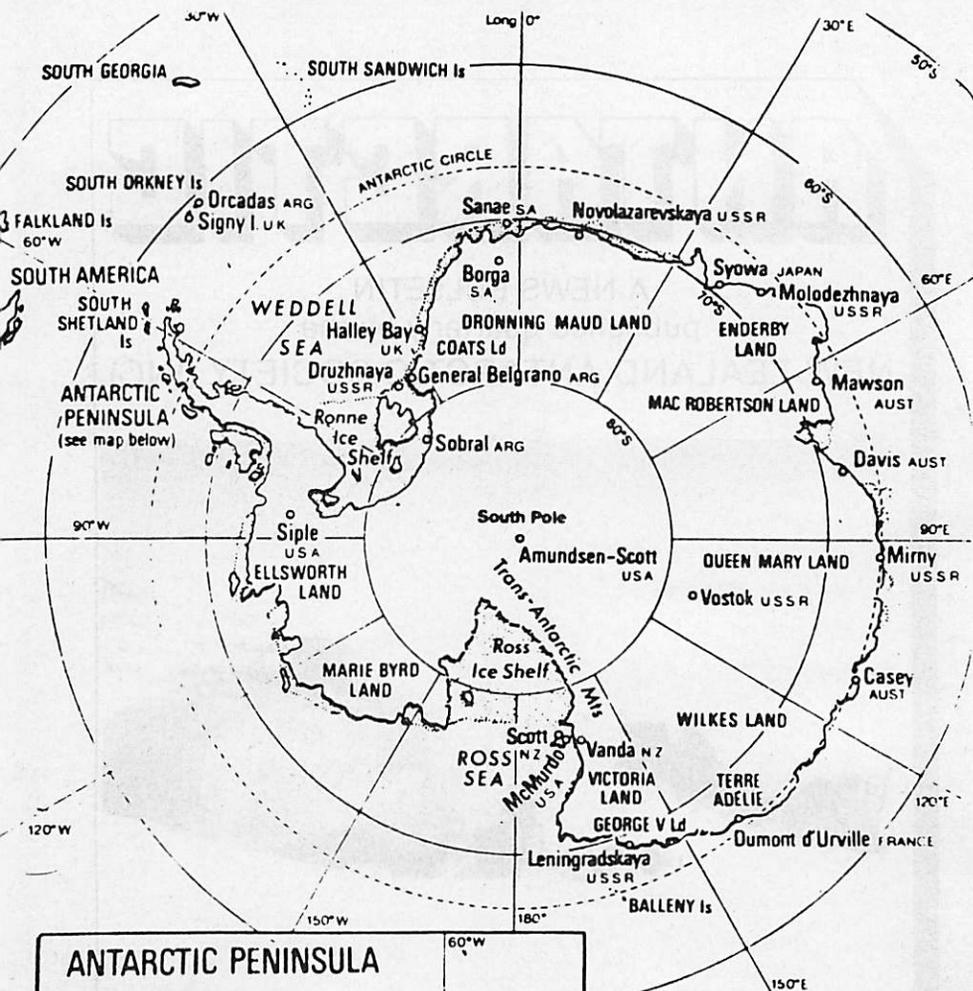
Beside this granite boulder on Inexpressible Island are the remains of the emergency supply depot placed on Hell's Gate beach on January 25, 1913, when the Terra Nova entered Terra Nova Bay on her last voyage from McMurdo Sound to New Zealand. The depot was found by a New Zealand geological mapping team which worked in the Terra Nova Bay region last summer.

Antarctic Division photo: Shaun Norman

Vol. 10, No. 1

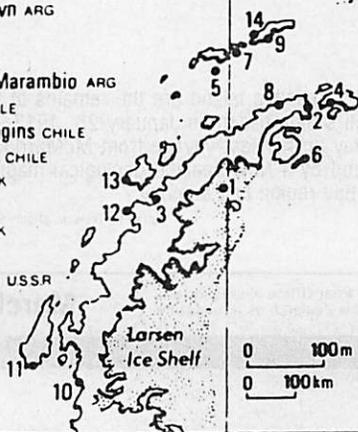
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- 1 Teniente Matienzo ARG
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- 10 Stonington I. UK
- 11 Adelaide I. UK
- 12 Argentine Is UK
- 13 Palmer USA
- 14 Bellingshausen USSR



ANTARCTICA

0 500 1000 Miles

0 500 1000 Kilometres

ABBREVIATIONS

ARG ARGENTINA
AUST AUSTRALIA

SA SOUTH AFRICA
UK UNITED KINGDOM
USA UNITED STATES OF AMERICA
USSR UNION OF SOVIET SOCIALIST
REPUBLICS

ANTARCTIC

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CONTENTS

ARTICLES

- 70-YEAR-OLD DEPOT 9-10
CUBANS SOUTH 38-39

POLAR ACTIVITIES

- NEW ZEALAND 2-8, 26, 39
UNITED STATES 11-17, 33
AUSTRALIA 18-22
UNITED KINGDOM 23-26
FRANCE 27-28
SOVIETY UNION 29-30
WEST GERMANY 34-36
INDIA 37
POLAND 41

SUB-ANTARCTIC

- HEARD ISLAND 40-41

GENERAL

- MINERAL RESOURCES 31-32
TOURISM 42-43
OBITUARY 43-44
BOOKSHELF 44

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N.Z. PROGRAMME

MT EREBUS TO CAPE HALLET

For the first time New Zealand's Antarctic research programme called on the services of more than 300 men and women last summer. In addition to scientists and support staff at Scott Base and Vanda Station the 1982-83 programme, which ended last month, included a large group of men from the New Zealand Army and the Royal New Zealand Air Force.

Most of the research last season was done in the McMurdo Sound and dry valley regions, but there were also ornithological and oceanographic projects along the Northern Victoria Land coast and in the Ross Sea. But for the first time since the late 1960s a New Zealand research team worked for nearly five weeks at Cape Hallett where a joint United States-New Zealand station was established in 1957 and closed as a summer station in 1973.

Scientific and logistic preparations for the biggest research project planned by New Zealand in Antarctica were made by the Antarctic Division, Victoria University of Wellington, and drilling experts from the Ministry of Works and Development and the Geophysics Division, Department of Scientific and Industrial Research. CIROS (Cenozoic Investigations in the Ross Sea) is a long-term offshore drilling project in McMurdo Sound which will cover the 1983-84, 1984-85, 1985-86, and 1986-87 seasons. New Zealand scientists will work on the project with guest scientists from the United States, Japan, and Australia.

A major logistic event last season was the completion of another stage in the rebuilding programme for Scott Base. The new kitchen and mess building was opened in November, and by the end of December the Army construction team had completed work on the fourth stage of the programme — erection of the prefabricated shell of the command centre which will house the Post Office, general administration offices, and telecommunications system. Its interior will be finished next season by another Army team, which will then start the fifth stage — erection of a new geophysical earth sciences laboratory.

Technical studies for the improvement of Scott Base communications with the rest of the world began last summer. A small team of Post Office engineers spent some time at the base investigating the problems of installing a satellite receiver dish. Next season a larger team with more equipment will make a longer technical study. If a satellite link is possible and economic it could be in operation within the next two or three years.

Vanda Station's living accommodation was upgraded last season. The mess block was relined and insulated and was ready for use two days before Christmas. In addition the existing sleeping quarters were replaced by an eight-man hut.

Both the New Zealand and United States programmes were supported by servicemen last summer. Air crews and maintenance staff were provided by the RNZAF; the Army provided a construction team, cargo and ship handlers, and mechanical and engineering services.

As in past seasons some scientific events in the 1982-83 programme were international in nature. New Zealanders took part in or supported projects with United States, Japanese, and Australian scientists in the dry valleys and on Mt



Modern Antarctic living: A view of the interior of the new kitchen and mess building at Scott Base. It replaces the mess hut erected when the base was established in 1957, and is equipped to provide self-service meals for up to 100 men and women.

Antarctic Division photo

Erebus. Nine guest scientists from England, Scotland, Japan, and Australia worked in the programme, and there were observers from the People's Republic of China and Italy.

Eleven men of the winter team officially began nearly seven months of isolation at Scott Base on February 21 when the last members of the summer team left by air for New Zealand. Mr J. Thurston, officer-in-charge for the summer, hauled down his flag on February 20 and handed over to his deputy, Mr G. L. Woodhead, who will be in charge until early in October.

Mr Woodhead, a 37-year-old primary school teacher from Paeroa, and his 10 companions will be in touch with New Zealand during the winter months by radio-telephone and telegraph, and will have 17 huskies for company. But they will have to wait for the spring flights by United States Navy Hercules aircraft at the end of August before they see new faces again.

Deputy officer-in-charge this winter is Mr R. C. Johnson, senior Post Office technician, of Dunedin. His companions are: A. L. Pemberton (base engineer, Arrowtown), C. Kelly (chef, Wellington), K. J. Kirkness (fitter-mechanic,

Invercargill), N. L. Wear (fitter-electrician, Auckland), G. Brown (technician, Auckland), A. E. Hassall (technician, Wellington), D. G. Martin (technician, Wellington), S. P. Johnson (senior Post Office clerk, Napier), W. D. Eaton (field leader-dog handler, Auckland).

Chris Kelly, who is a 24-year-old RNZAF corporal at Wigram, replaced D. J. Taylor. Gary Brown, a 22-year-old technician at the Defence Science Establishment, Devonport, was the replacement for I. M. Stevenston.

Because the United States Coast Guard icebreaker Glacier was delayed at Lyttelton for repairs to a generator the New Zealand ornithological research team which worked at Cape Hallett spent slightly less time there than planned. It was put ashore by helicopter on January 15, was picked up again on February 21, and arrived back at Wellington on March 1.

During their stay of nearly five weeks at Cape Hallett the four members of the team, Graham Wilson (leader), Jeni Bassett, Dr Jonathan Pascoe, and Linda Logan, replacement for Paul Ensor, who joined an International Whaling

Commission minke whale survey, worked on a programme planned as part of New Zealand's contribution to the three-year International Survey of Antarctic Seabirds (ISAS). This included pelagic observations of the distribution and numbers of birds during the voyage to and from Cape Hallett.

Main objective of the programme was to carry out a census of the population of the Adelie penguin rookery. The last was done in 1967. A count of 26,000 chicks was far below the number expected. Another project was to map the extent of the rookery and compare it with the area originally used by the penguins and the area available to them after Hallett Station was built. The area occupied had not been increased by colonisation.

A census of the Antarctic skua population was carried out by Dr Pascoe, who is a medical doctor and ornithologist. He found that there had been little if any increase above the numbers recorded in 1973. Further information on the foods and feeding of Adelie penguins to supplement data recorded from 1963 to 1965 was obtained by Linda Logan who collected 76 samples of stomach contents.

Just behind the penguin rookery is a specially protected area containing moss and lichens. A vegetation survey of the area which is protected to preserve its natural ecological system was made by Linda Logan.

MAPPING ROCKS

New Zealand's most remote expedition to the Terra Nova Bay region 400km from Scott Base was plagued by bad weather during its 70 days in the field but completed its detailed geological mapping by Precambrian and Early Paleozoic rocks. In addition members of the expedition discovered the remains of an emergency food depot left on Inexpressible Island by the Terra Nova in January, 1913 on her way back to New Zealand, and made accurate counts of 55,000 adult Adelie penguins in two rookeries.

Dr David Skinner, leader of the Geo-

logical Survey party, Colin Bradie (geologist), Shaun Norman (field leader), and Chris Morris (toboggan mechanic — meteorologist) were flown to Brown-ing Pass in the Terra Nova Bay area with five tonnes of equipment on November 13. After establishing their base camp the four men began the first part of their 10-week mapping programme which Dr Skinner began in 1962 and half-completed in 1969-70.

But the first stage — mapping rocks in the O'Kane Glacier, Lowry Bluff, and Black Ridge areas took 30 days instead of two weeks. The team spent many days in its polar tents waiting for the weather to clear. Then at the beginning of the third week of December the camp was buried deep in snow, and motor toboggans and sledges had to be dug out before the team could continue its programme.

In the first five weeks the party covered more than 900km, much of the distance over rough country which was hard on the toboggans and sledges. Replacement parts and welcome mail were parachuted in on December 20 by a United States Navy Hercules aircraft.

HEAVY SNOW

Christmas Day was just another working day but the four men welcomed a stop on their 30km journey south to Cape Confusion in the Northern Hills through soft snow for their meal of salmon pie, Christmas cake, and trimmings. Two-thirds of the first stage of the programme was completed, but the second stage — geological mapping of the Boomerang Glacier area had to be transferred to January because of heavy snow which buried rocks to a depth of 1.2m and stopped toboggan travel.

Early in January the four men worked on Inexpressible Island where the six men of Scott's Northern Party spent the winter of 1912 in a snow cave. Shaun Norman and Chris Morris were close to two Adelie penguin rookeries. One at Seaview Bay, less than 1km from the snow cave site, is well known; the other at 74deg 46min S/164deg 01min E is almost unknown.

Accurate counts of adult Adelies in both rookeries were made by the two men. At Seaview Bay the total count reached 38,200 and took 25 hours. The "Penguin Bay" rookery contained 16,800.

After 70 days in the field and more than 1000km of travel the expedition was picked up by a Hercules on January 21 and flown back to Scott Base. It returned with 700kg of geological specimens, some obtained at heights of up to 1000m.

BUSY STATION

With field parties of scientists from the United States, England, Scotland, Japan, Australia, and New Zealand working in the dry valleys or on the edge of the Polar Plateau Vanda Station was busy from mid-October to the end of January. Every summer it provides radio and logistic support for scientists in the field.

United States Navy helicopter support was provided for detailed investigations of coal occurrences in the vicinity of the Upper Wright Valley by three coal geologists, two Australian and one New Zealander. Dr John Bryan (leader) and Kerry Whitby, guest scientists from the Antarctic Coal Measures Study Group of New South Wales, Steven Edbrooke, of the N.Z. Geological Survey, and Simon Carr, an Antarctic Division field assistant, spent 25 days in the field studying Weller Coal Measures of Permian age at Mt Fleming and Shapeless Mountain, and at Mt Electra from where they mapped 950 kilometres of Permian coal measures and other strata in the western part of the Asgard and Olympus Ranges.

Except for a 2.52m thick seam discovered on the south side of Shapeless Mountain all the 12 coal seams examined and sampled for later analysis were heat affected and the coal appeared to have a high ash content. A previously unrecorded outcrop of Weller Coal Measures was located near the top of Mt Electra.

Analytical data on coal quality will be needed for a proper assessment of the coal resources in the area investigated.

But nearly all the coal seams at Mt Fleming and Shapeless Mountain are too thin to be mined, are variable in thickness, are mostly heat affected, and devolatilised. They have a high raw coal ash content (up to 25 per cent), are affected locally by substantial faults, folding and relatively steep (20 per cent) dips, and are intruded by dolerite sills, dykes, or volcanic plugs.

MOUNTAIN SHAPE

Another geologist who worked on Shapeless Mountain (2739m) last season was Dr Russell Korsch, of Victoria University of Wellington, who was there to determine why the mountain's geological structure is so irregular. With him were Bernard Napp, a VUW study, and Mike Hosted, an Antarctic Division field assistant.

Dr Korsch spent five weeks in Antarctica, most of them on Shapeless Mountain. But of his last 17 days he and his companions were confined to their tents by bad weather for 13 days.

In spite of the bad weather, however, Dr Korsch was able to confirm his belief that the irregular structure of Shapeless Mountain was caused by volcanic activity. Hot lava rising through many small vents converted water in the Beacon Supergroup sandstones of the mountain into steam, causing the rock to explode.

Nearly everywhere else the Beacon Supergroup sandstones are horizontally layered. On Shapeless Mountain they are broken up into chunks ranging from a few centimetres to half a kilometre in diameter. In places there is evidence of volcanic lava flows in the rocks.

Dr Korsch's team found many fossil reminders of Antarctica's temperate climate and forests millions of years ago. Among the specimens were fossil leaves and a section of tree trunk 3m long and nearly a metre across at its thickest part. The perfectly preserved growth rings showed that the tree was 200 years old when it died. That was 200 million years ago when the Shapeless Mountain area had forests, lakes, swamps, and rivers.

Waikato University's 13th expedition worked on three projects last summer, two in the dry valleys, and one in McMurdo Sound. One team took part in an international drilling project and related studies in the Taylor Valley with scientists from the United States Geological Survey, Arizona, and the University of Maine at Orono, who were supported by an Antarctic Division drill crew. A second Waikato team continued research into the microbiology of the dry valley lakes, and the third continued ice dynamics and solar energy research in McMurdo Sound.

A Scottish guest scientist, Dr Rodney Herbert, of the University of Dundee, who worked in the South Orkneys in the 1976-77 season, joined Dr Chris Harfoot and Paul Champion (technician) in Waikato studies of the micro-organisms which play an important role in the recycling of nutrients between the oxygenated and de-oxygenated layers of lakes like Lake Fryxell in the Lower Taylor Valley.

Lake Fryxell was the main study site of Dr Harfoot's team. There the scientists had to use an ice auger to drill through surface ice up to 5m thick for water samples. Enough light penetrates the surface ice on Lake Fryxell which is 4.5m thick for algae to grow in the water underneath. One of the team's objectives was to determine the factors which enable these algae to grow in such dim conditions where the water temperatures are low.

In the Lower Taylor drilling project which ran from late November to early January the purpose was to obtain cores of sediments laid down during the various epochs of Ross Sea glaciation. Study of these will help to increase understanding of the Cenozoic glacial and climatic history of the dry valley region up to 65 million years ago.

Dr Don Elston, of the U.S. Geological Survey was the principal scientist for the event, and worked with a colleague, Dr Hugh Rieck, and a New Zealander, Dr Paul Robinson, who was employed by the Antarctic Division. Dr Chris Hendy, who led the Waikato expedition, and his

two students, Laurie McLeod and Richard Ede, studied the pattern of salt and nutrient discharge from the Canada Glacier, and from the algal flushes in Lake Fryxell, while they were in the Taylor Valley region. Dr George H. Denton, of the University of Maine, with his students and a New Zealand field assistant, Howard Conway, continued his studies of the Cenozoic glacial history of Antarctica in the Taylor Valley and other dry valleys.

DRILLING PROBLEMS

During the season the four New Zealand drillers, James Jenkins, Roy Parish, Greg Ryan, and Lew Sanson, drilled six planned holes through sand, mud, and pebble sediments cemented together by ice. One of the original six holes had to be abandoned at a depth of 10m because of damage to the drill bits caused by boulders and debris. An unusually warm December created a problem with the diesel drilling fluid used as a lubricant. A dry ice-making machine had to be brought in to cool the fluid so it would not melt ice in the drill hole and prevent core sampling of the sediments.

In the 1980-81 season Robin Holdsworth, of the Waikato physics department, tested a solar panel at Lake Fryxell. Last summer he used a 12-volt 2-ampere solar panel on the McMurdo Sound sea ice to charge lead acid batteries for his ice dynamics programme in which he was assisted by Jon Davys, of the mathematics department, and two Antarctic Division field staff, David Wills and Tony Parker. He also continued his earlier studies of the Erebus Glacier Ice Tongue.

On Ross Island a biological research team from the University of Canterbury botany department led by Dr Laurence Greenfield, included two guest scientists, Dr Paul Broady, a Melbourne University phycologist, and a microbiologist, Dr David Wynn-Williams, of the British Antarctic Survey. The team was put in by helicopter at Cape Bird in November, and began research on microbial colonisation of soil and rock, the nitrogen budget of penguin and moss plant sites, and oil decomposition.

In December David Wynn-Williams and Tas Carryer visited the Blue Glacier, the Beacon Heights, Barwick Valley, and Shapeless Mountain to conduct aerobiological monitoring, plant surveys and to sample endolithic microbes and other primary colonisers. Paul Broady spent November and most of December on Erebus where he undertook a floristic survey and studied microbes living on the hot soils.

After having been isolated on the volcano for 10 days by the weather Paul Broady arrived on December 21 at Cape Bird where he continued mapping the moss and algae distributions. David Wynn-Williams returned on January 8 and resumed earlier work on microbes, plants, and soils.

A portable video unit was used by the team to record details of its main sampling site at Cape Bird for use in long-term studies. The Cape Bird area is the world's most southerly studied ecosystem, and a film record will be of great use in future years to record changes in the topography, bird numbers, and plant cover. In addition a general film was produced for teaching and general public viewing.

An unusual aspect of last season was the mild weather which was reflected in the fauna and flora. Normal summer temperatures at Cape Bird are about minus 18deg Celsius in November but there rise to minus 5deg in January. A low of only minus 7deg was encountered last season, and apart from a five-day blizzard in early December the weather was mostly fine and sunny.

A University of Canterbury study of marine ecosystems in McMurdo Sound which began in the 1976-77 season was completed last season by Professor George Knox and three zoology students, Noel Shanks, Jonathan Peacey, and Miss Tracey Osborne. They spent two months investigating the dynamics of the ecosystems under sea ice and permanent shelf ice. For the last two weeks of the season they were joined by Dr James Rounick, of the Institute of Nuclear Sciences, Department of Scientific and Industrial Research.

During the first two seasons of the study Professor Knox examined marine communities under the permanent ice shelf near White Island. So little light penetrates the thick ice shelf that photosynthesis is impossible. Food for the rich community of animals on the sea floor there is carried in by currents from the outer parts of McMurdo Sound where photosynthesis can take place under the thin sea ice.

In the 1979-80 summer Professor Knox's group monitored a site 12km west of Scott Base for the whole season. Last season Professor Knox on his 12th visit to Antarctic since his first in 1960, studied three sites across McMurdo Sound — near Scott Base, in the middle of the sound, and near the coastline of the continent. At each station his team examined the physical, chemical and biological characteristics of sea water from just under the ice to a depth of 300m.

Each station was in a different water mass and the biological productivity of each was quite different. The area in the middle of McMurdo Sound was found to be the most productive.

One special aspect of the work was a study of the population dynamics of the ice edge euphausiid *Euphausia crystallophias*. This small shrimp-like creature is the main food of the minke whale.

TEAM ON EREBUS

Once again a New Zealand team worked on Erebus with United States and Japanese scientists in the International Mr Erebus Seismic Study (IM-ESS). In addition a Geological Survey party led by Peter Otway continued the survey of the nature and rate of deformation in the summit region of the volcano, a project begun in the 1980-81 season.

Weather played a major role in the third and final year of IMESS. Towards the end of November Peter Otway, Steve Currie, a Ministry of Works and Development surveyor, and Lindsay Bell, one of the snowcraft and survival team, were flown first to the acclimatisation camp on Erebus, and two days

later were at work on the summit area. By December 9 they completed the resurvey of the markers placed round the summit caldera to measure deformation, and installed a borehole tiltmeter.

But like the second half of the New Zealand team at Scott Base they had to wait for a break in the bad weather which stopped Erebus flights between December 3 and December 17. A combined United States-New Zealand-Japanese team reached the Erebus hut 600m below the summit on December 21, and Dr Ray Dibble, a Victoria University of Wellington seismologist who has worked with IMESS since it began, was able to start his seismic observations, assisted by VUW student, Ian Paintin, and Lindsay Bell.

Between December 21 and January 4 when it returned to Scott Base Dr Dibble's team completed a number of pro-

jects. A new infrasonic pressure-sensitive microphone and a solar panel were installed, the telemetry transmitter was serviced, and the magnetic induction loop around the crater was repaired. Sections of the loop at risk from weather or volcanic activity were re-buried. An electro-magnetic survey was also carried out to determine the extent of the magma under the summit plateau.

Dr Dibble's work was not finished on January 4, however. The infrasonic microphone on the crater rim ceased recording while he was at Scott Base waiting to fly home. The weather was kinder this time, and Dr Dibble had to wait only a day before he flew back to repair the fault. Repairs did not take long, and Dr Dibble flew back to New Zealand on January 12.

Scott Base Ski Club's new member

When Prince Edward, the Queen's youngest son, returned to Christchurch on December 15 after his Antarctic holiday, which began on December 8, he had with him two unusual souvenirs of his stay. They were a container of water which had fallen as snow at the South Pole more than 70 years ago, and the badge of the world's southernmost ski club.

Prince Edward flew to the South Pole on December 11 in a United States Navy ski-equipped Hercules aircraft. When he arrived the temperature was minus 28deg Celsius. After a tour of the Amundsen-Scott South Pole Station and the summer research projects he was taken to 90deg S where every direction is north.

At the South Pole Dr Mary Vickers, station science leader, who has remained there this winter, presented Prince Edward with a container of water that had fallen as snow in the summer of 1911-12 when Amundsen and Scott reached the Pole. The compacted snow came from an ice core taken from 12m below the present snow surface. At that depth the snow had been compacted to ice which remained at minus 50deg C all the year round.

On December 12 Prince Edward joined 24 other ski enthusiasts from Scott Base and McMurdo Station for the official opening of the Scott Base Ski Club's season. The weather was ideal for ski-ing — packed snow, sunny skies, no wind, and a temperature of 2 deg C.

Prince Edward was towed up to Castle Hill on the spine of Hut Point Peninsula and then made a downhill run of nearly 125m to the club's chalet. He thus qualified for membership of one of the most exclusive ski clubs in the world — prospective members have to travel to Antarctica to join it — and now can wear its coveted badge.

This badge is easy to recognise. On a navy blue background are the words: Scott Base Ski Club, Antarctica. The skier on a white background is a perky Adelie penguin with red skis and ski sticks, and a red scarf.



70-YEAR-OLD FOOD DEPOT

Seventy years ago on January 25, 1913, Scott's last expedition left a large emergency food depot in Terra Nova Bay on the final voyage of the Terra Nova from Ross Island to New Zealand. On January 8 this year the remains of the depot on the Hell's Gate beach of Inexpressible Island were discovered by members of a New Zealand geological expedition which worked in the Terra Nova Bay region from the middle of November to late January.

Inexpressible Island was where six members of Scott's Northern Party led

route to Wood Bay. During their winter in the snow cave the six men used the food and oil in the Hell's Gate depot.

When the Terra Nova entered Terra Nova Bay on January 25, 1913, so that specimens left behind by the geologist, Raymond Priestley, could be retrieved, Campbell, who had led the Northern Party back to safety on Ross Island, suggested a depot should be left behind. It contained enough food for a party of five or six to make its way to Butter Point, and also tents and sledges.



Food boxes, parts of a Nansen cooker, a pick and shovel, and a fuel can from the emergency depot on Hell's Gate beach, Inexpressible Island.

Antarctic Division photo: Shaun Norman

by Victor Campbell lived for more than six months in a 3.6m by 2.7m snow cave during the winter of 1912. When the party was landed in Evans Cove on January 8, 1912, food, oil, clothing, and spare sledges were put in a depot on a big moraine later known as Hell's Gate Moraine. Because of heavy ice the Terra Nova could not pick up Campbell's party after its sledging journey to find a

New Zealand's most remote field party last summer was led by Dr David Skinner. With him were Colin Brodie (geologist), Shaun Norman (field leader) and Chris Morris (toboggan mechanic). After geological mapping of Precambrian and Early Palaeozoic rocks in the Terra Nova Bay region the party spent some time on Inexpressible Island where the site of the snow cave is marked by a

wooden sign erected in the 1969-70 season, and four metal plaques in English, French, Spanish, and Russian, put there in 1981.

On December 26 last year the party visited the snow cave site and also attempted to locate the Hell's Gate depot. Because of heavy snow cover only the wooden sign, the metal plaques, and one small blubber lamp were found at the site. The blubber lamp was wedged against the boulder which shelters the plaques.

Shaun Norman and Chris Morris made a search for relics at the snow cave site on January 8. They found an item of windproof clothing jammed under a rock some 18.2m east of the plaques and saw a few penguin or seal bones. The sighting on the same day of 7.6cm of pick-axe handle and the corner of the food box led to the discovery of the 1913 depot on Hell's Gate beach.

After some careful digging the two men found a 2.7m manhaul sledge, about 15.2m of 2.5cm tape, six food boxes (two cocoa, two sugar, and two unlabelled, and a Nansen cooker set of spoons, mugs, jugs, and two billies, one of 13.6 litres capacity).

Of six bamboo tent poles dug out of the snow four were still affixed to the tent cap. A very rusted 18-litre tin, a 4½ litre fuel container without a tap, one pick, one shovel, and four candles, were also found in the depot.

There was no sign of a primus cooker or a tent seen before by Dr Skinner in 1962-63 and 1969-70. Everything was in an advanced state of decay after 70 years of exposure to wind, salt spray, penguins, and rust. The sledge had lost its cowcatcher, and nearly all of one runner. All the remaining bindings were rotten, and the leather and caps of the runners and cargo strips had crumbled.

Shaun Norman and Chris Morris cleared as much snow as possible from the depot material and put individual items in the sun to dry. Before they left the site the depot was repacked with stones to hold everything down. Then the depot was marked with a small cairn, numerous photographs were taken, and the position was noted in detail.

Next to the depot remains is a moderately conspicuous spherical grey coarse granite boulder about 6m in diameter, and marked by the cairn. The site is 6m above sea level and 7m from the point where the boulders disappear into the ice foot of the beach. Also the site is 300 to 400m north-west from the extreme inland end of the cliffs and outcrops which form the western shore of Evans Cove.

Hell's Gate shelf ice at its western end runs in to meet the Inexpressible Island beach at an acute almost parallel angle. Where the edge of the shelf is about 70m from shore is opposite the depot site which is at 74deg 53min S/163deg 46min E.

On January 12 Dr Skinner and Shaun Norman made an interesting discovery on the beach of Seaview Bay. They passed close to the snow cave site on the way to Seaview Cliffs but none of the large stones Dr Skinner had seen at the site in earlier seasons was visible.

On the Seaview Bay beach at various places up to 1km from the snow cave site were the remains of butchered seals presumably killed for food by the Northern Party.

Polar Medal

Miniatures of the Polar Medal have not been struck for several years and recent New Zealand recipients have not been able to obtain them. The miniature worn with evening dress on formal occasions does not accompany the award and recipients have to provide it themselves.

Arrangements have now been made by a New Zealand firm to have a stock of miniatures struck from a die made available by the Royal Mint in London. These are expected to cost \$20 with the white ribbon plus postage. Those interested can order miniatures from A. H. Abel, P.O. Box 658, Christchurch, New Zealand.



U.S. and British project in Ellsworth Land

A joint investigation with the British Antarctic Survey in Ellsworth Land to gain understanding of the tectonic development of West Antarctica and its relationship to East Antarctica will be one of the major projects of the United States Antarctic Research Programme (USARP) next season. Research will include work in geology, palaeomagnetism, geochronology and geophysicists with ice radio-echo sounding and aeromagnetic surveys by British geologists and geophysicists.

Another joint programme with glaciologists of Expeditions Polaires Francaises will be carried out at the Amundsen-Scott South Pole Station. Ice sampling will be done to greater depths by the use of a thermal probe. The scientists hope to drill through about 3000m of ice to bedrock. So far the greatest depth achieved is less than 260m.

In the next three years United States research will lay more emphasis on glaciological investigations in West Antarctica, particularly in the Siple Coast area. The purpose is to obtain more information about the tremendous ice movement on the western side of the Polar Plateau.

Siple Coast (82deg 00min S/155 deg 00min W) is the middle portion of the relatively ill-defined coast along the east side of the Ross Ice Shelf between the north end of the Gould Coast (83deg 30min S/153deg 00min W) and the south end of the Shirase Coast (80deg 10min S/151deg 00min W). Last season the United States Geological Survey mapped the Siple Coast, including the Crary Ice Rise on the Ross Ice Shelf, from the air with the support of a Hercules aircraft of the United States Navy's VXE-6 Squadron. The project provided reconnaissance photographs for potential new field study sites in the glaciological sciences.

For several seasons USARP scientists have compiled data and conducted field research to gain an understanding of the relationship of East and West Antarctica through geologic time. Past investigations have concentrated on the Scotia Arc. Now more data is needed on the

region at the base of the Antarctic Peninsula extending to the Ellsworth, Thiel, and Whitmore Mountains.

To prepare for the USARP-BAS geological survey next season VXE-6 Squadron Hercules aircraft flew deep into Ellsworth Land from McMurdo Station last summer and established fuel stations for Twin Otter aircraft in the Ellsworth Mountains, the Martin Hills, and at Mt Smart. Another 15,000 gallons of fuel is expected to be cached at the sites next summer, and 33,000 gallons in the 1984-85 summers. The BAS Twin Otters will fly to the research area from Rothera on Adelaide Island off the Antarctic Peninsula.

Mt Smart at 75deg 16min S/70deg 14min W is 6.4km south-west of Mt Ballard in the south-west part of the Sweeney Mountains in Ellsworth Land. The Martin Hills (82deg 04min S/88deg 01min W) are an isolated range of hills nearly 6.4km long and about 80km south of the Pirrit Hills. Another isolated group at 81deg 17min S/85deg 21min W, the Pirrit Hills lie south of the Ellsworth Mountains between the Heritage Range and the Nash Hills.

Scientific projects and logistic support for the United States research programme next season are expected to cost

more than \$100 million. The National Science Foundation which finances and co-ordinates the whole programme, has been allocated \$102 million for the fiscal year. This runs from October 1 this year to October 1, 1984. Most of the total budget which still has to be approved by Congressional committees will be used for support of research projects by aircraft, icebreakers, and cargo ships, fuel supplies, maintenance of inland and coastal stations, and contract services. One of the four stations, Siple, in Ellsworth Land, will be closed next summer for two years, and opened again in 1985.

Last season, which began officially on October 4 and ended late in February, about 285 scientists, including more than 30 women and representatives of 12 other countries, did research on the continent and in southern waters. There were 84 projects in the programme.

Support by sea of the research programme ran into more difficulties than the air support operations. The United States Coast Guard icebreaker Glacier, which first went south in 1955, was delayed in port by generator trouble, and the cargo ship Southern Cross faced cargo handling difficulties when the ice wharf in Winter Quarters Bay started to break up in its fourth season of use.

But the Glacier completed all her cruises in support of science projects in McMurdo Sound and the Ross Sea, and sent the tanker Maumee and the Southern Cross safely on their way home from Winter Quarters Bay. The Southern Cross was able to discharge and load cargo on both her voyage south although cargo handlers had to work round the clock on the disintegrating ice wharf.

ROUND CONTINENT

Compared with the veteran Glacier the Polar Star is still a youngster. But she made her mark last season by a 69-day circumnavigation of the Antarctic Continent between late December and early March. She started and finished at Palmer Station on Anvers Island, and sailed round the coast of East Antarctica with marine biological

research teams, and a party from the Arms Control and Disarmament Agency which inspected 11 coastal stations of other nations. Only seven ships have circumnavigated Antarctica, the first being Captain Cook's Resolution between 1772 and 1775.

In addition to the establishment of fuel stations in Ellsworth Land VXE-6 Squadron Hercules aircraft carried out two major operations in support of the research programme. These were to Siple Station 2250km from McMurdo Station, and the Amundsen-Scott South Pole Station 1327km south of Ross Island. Starting early in November the aircraft carried many tonnes of cargo and thousands of gallons of fuel to the stations for the summer and winter parties.

No difficulties were encountered except on two flights to Pole Station. On November 5 the Hercules which made the first landing of the summer damaged its nose ski and was stranded for more than two weeks. Another Hercules had the same trouble on January 23 but was at the Pole for only a few days while spare parts were obtained and flown in.

Apart from its major logistic efforts VXE-6 Squadron also provided support for scientific projects in other remote areas of Antarctica. Its aircraft landed field parties in North Victoria Land and the Thiel Mountains, flew to Dome C in Wilkes Land, and carried a French meteorological team 1500km from McMurdo Station to the ice runway near Dumont d'Urville. Helicopters also provided support for operations on Mt Erebus, around McMurdo Sound, and in the dry valleys.

MORE METEORITES

One feature of last season's research programme was the discovery of new concentrations of meteorites in the Thiel Mountains and on the bare ice in the Allan Hills area of Victoria Land. One field team in the expedition led by Dr William Cassidy, of the University of Pittsburgh, who has been engaged in the search for meteorites since the 1976-77 season, found 31 specimens at the Pecora

Escarpment, the southernmost exposure of rocks in the Pensacola Mountains about 500km from the South Pole.

Of the 31 specimens found at the Pecora Escarpment 28 were carbonaceous chondrites, a very rare type containing carbon molecules. There was also one achondrite. Only about a dozen meteorites containing carbon have been found so far.

Later the same field team collected more specimens at the Davis and Moulton Escarpments of the Thiel Mountains. Occurrences at the Moulton Escarpment and in part of the Pecora Escarpment were unusual in that many meteorites were found downstream of exposed barriers to ice flow. The team collected 43 ordinary chondrites, six achondrites, and one carbonaceous chondrite in the Thiel Mountains area.

New sites of meteorite occurrence were also found by another field team led by Dr Cassidy, which worked at the principal concentration site in the Allan Hills area, and at Elephant Moraine 80km to the north and 70km west of Reckling Peak, (See map, "Antarctic," December, 1982). The team also visited one ice patch 90km west of Allan Hills, and another 50km south-west of Elephant Moraine.

NEW SITES

Sixty-three meteorites were recovered from new sites at the Allan Hills far west icefield, the western extension of the Elephant Moraine icefield, and at a very large icefield north of the Elephant Moraine icefield. Of these 60 were chondrites, two carbonaceous chondrites, and one an achondrite. At the far west icefield one meteorite was apparently weathering out of ice. It was collected as it lay encased in a large block of ice.

Altogether Dr Cassidy's expedition collected 144 meteorites. Of these 105 were chondrites, 31 carbonaceous chondrites, and eight achondrites. In the 1981-82 season the expedition recovered 378 specimens.

Efforts by United States and Swiss scientists to drill 500m into the ice at the South Pole Station to obtain a core that

would provide clues to weather and climate and volcanic activity thousands of years ago were not successful. Drilling started in late November but was stopped on December 14 when the electro-mechanical drill had reached a depth of 230.47m.

LESS PRODUCTIVE

Results of a radiometric resource and radioactivity survey of outcrops at Szabo Bluff (86deg 29min S/140deg 48min W) in the Queen Maud Mountains less than 320km from the South Pole was not as productive as expected. The outcrops were much smaller and only low levels of radioactivity were discovered.

Six scientists from the University of Kansas, the West German Federal Bureau of Geosciences and Natural Resources, and the University of Quebec, were flown to Szabo Bluff from McMurdo Station by a VXE-6 Squadron Hercules late in November and worked from their remote field camp until the end of December. They extended their survey from the base camp by using motor toboggans and sledges, and collected rock samples for later analysis.

Once again the survey team was led by Dr Edward J. Zeller, who has made airborne surveys with a gamma-ray spectrometer since the 1975-76 season to assess the potential resources of uranium and other radioactive elements in Antarctica's exposed rocks. In addition to the Szabo Bluff survey last season the team retrieved on Ross Island 35 radiation dosimeters placed on Observation Hill and at Trachyte Hill at Cape Bird in the 1981-82 season.

Seismic stations installed on Mt Erebus, the world's southernmost active volcano, recorded "an astounding" 650 small earthquakes on October 8 last year. Since the 1980-81 season seismic activities on the volcano have been monitored by an international team of scientists from New Zealand, the United States, and Japan.

When the scientists led by the New Zealand-born geologist, Dr Philip Kyle, of the New Mexico Institute of Mining

and Technology returned to Erebus in early November for the third season of IMESS (International Mt Erebus Seismic Study) they checked the four seismic stations, three on the slopes of the 3794m volcano and one near the summit cone. These had recorded an unusual amount of seismic activity in September and early October.

Before the 650 small earthquakes on October 8 the seismometers recorded an average of 20 to 80 such tremors each day. There were 140 tremors on October 9 and 120 on October 10. Some of the strongest earthquakes since the 1980-81 season occurred on October 8 but registered less than 2 on the Richter scale.

Visual examination of the volcano showed there were no lava flows or other external signs of an eruption. Dr Kyle said later that the quakes had been caused by the movement of magma (molten rock) within the earth.

SECOND VOLCANO

In the active crater of Erebus there is an exposed lava lake 91m in diameter which is one of two active lava lakes in the world. Last season the IMESS team found that the lake had dropped about 3m or lost about 90,000 cubic metres of lava since the previous season. The scientists speculated that magma had forced itself into a crack in the volcano and spread out like an arm from the magma chamber.

Later in the season United States and New Zealand scientists joined the Glacier to continue studies of volcanic activities along the coast of North Victoria Land, and to make a reconnaissance of Mt Melbourne, the only other active volcano in the Ross Sea area. The purpose of the reconnaissance was to detect changes or cooling in the 2730m volcano.

Mt Melbourne (74deg 21min S/164deg 42min E) surmounts the projection of the coast between Wood Bay and Terra Nova Bay. It was climbed in January, 1967, by a New Zealand geological mapping team which reported signs of volcanic activity.

With helicopter support from the Glacier a team climbed Mt Melbourne in January this year. It found a layer of volcanic material in the ice, visited 100m of ice caves, and reported that summit temperatures, warm ground areas, and fumaroles, were essentially the same as in 1972.

SEA AND AIR

In support of the United States and New Zealand programmes and to maintain the American inland stations aircraft of the United States Navy and Air Force, and the Royal New Zealand Air Force carried 873 tonnes of cargo and 1714 passengers to Antarctica during the four months of the season. Between October 4 and February 23 aircraft made 106 round trips between Christchurch and McMurdo Station. In the 1981-82 season when the Royal Australian Air Force also took part in the airlift 1029 tonnes of cargo and 1558 passengers were carried.

Of last season's flights 74 were made by VXE-6 Squadron's ski-equipped Hercules aircraft, 19 by the U.S. Air Force wheeled Starlifters, and 13 by the RNZAF. Twelve New Zealand flights were made between November 14 and November 29, and the last on December 8. On these flights the Hercules aircraft carried 130.9 tonnes of cargo and 143 passengers. The last flight carried five passengers, one being Prince Edward, youngest son of Queen Elizabeth, and 4.6 tonnes of cargo. ("Antarctic," December, 1982).

More fuel was shipped south than in the previous season, and almost as much cargo was carried by the Southern Cross, which made two voyages, the first direct from Port Hueneme, California, and the second from Lyttelton. The fleet tanker U.S.N.S. Maumee took 7,380,000 U.S. gallons of fuel for McMurdo Station and the Coast Guard icebreakers Polar Star and Glacier, compared with 5,155,184 gallons in the 1981-82 season.

Nearly 800,000 gallons of fuel was transferred from the Maumee to the Polar Star which escorted her through the sea ice channel in McMurdo Sound

to Winter Quarters Bay on January 20. The remainder of the tanker's fuel — 3,000,000 gallons of jet fuel, 3,200,000 gallons of diesel fuel, and 300,000 gallons of motor spirit — was transferred to McMurdo Station's 8.8 million gallon bulk storage tanks in 64 hours of pumping time. On January 24 the Maumee sailed for Lyttelton where she arrived and sailed for home of January 31.

THIRD VOYAGE

On her third voyage to Antarctic waters the Polar Star relieved Palmer Station where she arrived on December 24. She sailed again on December 27 for McMurdo Station and arrived at the edge of the fast ice on January 6 to begin her first task of cutting a channel through the sea ice in McMurdo Sound to Winter Quarters Bay for the Maumee and the Southern Cross. She ploughed through 48km of ice .9m to 1.5m thick and arrived at McMurdo Station on January 8.

Before she met the Maumee at the northern edge of the pack ice to escort her into McMurdo Sound the Polar Star met the Glacier near Coulman Island for the transfer of supplies and lubricating oil to enable her to continue her circumnavigation of the continent.

When the Polar Star sailed from McMurdo Station on January 21 she carried 17 passengers. Four were from the staff of the United States Arms Control and Disarmament Agency — Dr Albert S. Chapman, Commander Maria Kasanowska, Colonel John A. Raymond and Mr Ronald A. Gaiduk. They were aboard to inspect 11 stations, most of them in East Antarctica, in accordance with the terms of the Antarctic Treaty.

Thirteen scientists were on the voyage to carry out five marine biological projects. These included studies near the coasts of Victoria Land, Wilkes Land, Enderby Land, and Queen Maud Land, of the distribution of marine birds in relation to krill, and the distribution of marine birds and mammals in the pack ice of the eastern sector. The scientists also made a census of seals in the pack ice during the voyage.

STATION VISITS

First of the stations to be inspected was Leningradskaya on the Oates Coast. When the Polar Star was 28 nautical miles from the Soviet station she encountered heavy pack ice. She needed two fully operational helicopters for the inspection, and on January 24 received an air drop of spare parts from McMurdo Station by a VXE-6 Hercules.

Leningradskaya was inspected on January 25, and the Polar Star continued on to Dumont d'Urville. In the first three weeks of February she also inspected Casey, Mirny, Davis, Mawson, Molodezhnaya, Syowa, Novolazarevskaya, and Sanae. The final inspection was of the new West German station, Georg von Neumayer, in Atka Bay.

After she had completed the inspection of Davis the Polar Star went to the assistance of the Oceanic Research Foundation's ship Dick Smith Explorer which was beset in pack ice at 66deg 57min S/78deg 14min E on February 6. Later in the month she had a rendezvous at 69deg 57min S/10deg 53min E with the Norwegian research ship Polarsirkel under charter to the second Indian expedition.

Early this month the Polar Star completed her circumnavigation of Antarctica when she returned to Palmer Station on Anvers Island on March 8. She picked up passengers and cargo and then sailed for the Chilean port of Punta Arenas, Tierra del Fuego.

On December 22 the Glacier, which had called at Wellington previously, arrived at Lyttelton to begin her 22nd voyage to Antarctica. It was her first visit since 1973. She sailed on the evening of December 27 with passengers and cargo for the New Zealand meteorological station on Campbell Island, four members of the New Zealand ornithological expedition to Cape Hallett, and other New Zealand and United States scientists.

Age seemed to have caught up with the veteran icebreaker on December 29 when she ran into a violent storm 86 nautical miles south of New Zealand. A 22-year-old apprentice seaman, Brent

David Lehman, of Chicago, was knocked unconscious and broke a leg. He was flown by helicopter to hospital in Invercargill, and the Glacier had to return to Lyttelton because of a faulty generator which could not be repaired at sea.

Back in port on December 31 the Glacier remained there until January 7 when she sailed south again. Two technicians were flown from the United States to repair the generator. No further trouble was experienced, and after her call at Campbell Island on January 10 the ice-breaker continued her mission of providing support for United States and New Zealand science projects in the Ross Sea and along the Victoria Land coast from Cape Adare to Inexpressible Island to Terra Nova Bay.

After landing the New Zealand expedition at Cape Hallett on January 15 the Glacier arrived at McMurdo Station on January 22 and prepared for her science cruises in McMurdo Sound and the western Ross Sea. She saw the Maumees on her way north on January 24 and escorted the Southern Cross to Winter Quarters Bay on January 26.

ICE CRACKS

Trouble awaited the Southern Cross when she arrived with about 7000 tonnes of cargo loaded at Port Hueneme. The ice wharf, in use for the last three seasons, had begun to crack, and working space was reduced from about 150m to nearly 60m. Cargo had to be unloaded on to pieces of the ice wharf with the help of bridges.

Fifty-nine United States Navy and New Zealand Army cargo handlers were flown from Christchurch to assist with the unloading and loading of the Southern Cross, but she did not sail for Lyttelton until February 3. On the voyage north she struck heavy seas, fog, and more ice than usual, and did not arrive until February 8.

Special efforts were made to load the Southern Cross at Lyttelton but hopes of a 24-hour turnaround were dashed by heavy rain. The breaking of part of the heavy deck lifting gear extended her stay by more than two days and nights.

When the Southern Cross sailed on her final voyage at 6 p.m. on February 10 she carried 2866 tonnes of cargo. This included 215.76 tonnes of cargo needed for the continuation of the Scott Base rebuilding programme next season.

LAST TASKS

Working space on the crumbling ice wharf had been reduced to 50m when the Southern Cross was escorted into Winter Quarters Bay by the Glacier on February 15. The cargo handlers worked around the clock to unload and load the ship before the ice wharf broke up completely, and she sailed on February 19 for Lyttelton where she arrived on February 24. After repairs to her deck cargo handling gear she sailed for the United States.

One of the last tasks of the Glacier before she departed on her final marine research cruise in the Ross Sea was to tow the remains of the ice wharf out to sea. Then she headed north to pick up the New Zealand research team at Cape Hallett on February 21. After a call at Campbell Island she arrived at Wellington on March 1.

During the season which ended with the last flights to Christchurch from McMurdo Station on February 23 the National Science Foundation research vessel Hero made four cruises to the Antarctic Peninsula area. The first two were from Punta Arenas to Palmer Station, and the third and fourth between December 18 and April 15 were for investigations of birds, seals, fish and krill in the Peninsula area.



Two Soviet ships in McMurdo Sound

Two Soviet research ships made unexpected and unannounced visits to McMurdo Sound last month. The Admiral Vladimirsky (9100 tonnes) stayed for nearly three hours; the Yunony (2323 tonnes) remained only 22 minutes. They were the first Soviet ships to visit McMurdo Sound since the United States began activities there in 1955.

Before she arrived in McMurdo Sound at 9.45 a.m. G.M.T. (10.45 a.m. N.Z.) on February 9 the Admiral Vladimirsky was in voice communication with the cruise ship World Discoverer which was anchored .8km offshore from Ross Island in Winter Quarters Bay.

during which the ship's captain declined an invitation to dinner, she sailed out of McMurdo Sound into the Ross Sea.

On the evening of February 14 the trawler-research vessel Yunony arrived in McMurdo Sound at 9.30 p.m. (10.35 p.m. N.Z.). Initial communications indicated that she was a trawler avoiding bad weather but did not intend to send anyone ashore. Later communications indicated that she was a research vessel.

After sending "good regards for American science" the Yunony departed. She left McMurdo Sound at 9.57 p.m. (10.57 p.m. N.Z.)

Three weeks later on March 8 the



A Soviet naval research ship, the Admiral Vladimirsky, which visited McMurdo Sound briefly last month. She is shown here heading south to Winter Quarters Bay.

Photo by Colin Monteath

Shortly after her arrival the ship dropped anchor briefly off Cape Armitage, launched a helicopter within minutes, and then withdrew to a distance of about 3.2km from McMurdo Station.

When the ship's Kamov 25 helicopter was airborne at 11.30 a.m. (12.30 p.m. N.Z.) it flew first to the Williams Field skiway on the McMurdo Ice Shelf, and then over Scott Base, McMurdo Station and its helicopter landing pad, and the ice wharf in Winter Quarters Bay. A radio invitation to land was declined, and the flight ended at 12.35 p.m. (1.35 p.m. N.Z.)

By 12.40 p.m. (1.40 p.m. N.Z.) the Admiral Vladimirsky was under way. After a brief exchange of pleasantries,

Yunony returned to McMurdo Sound. Six Soviet scientists, their leader, and the ship's captain spent five hours ashore, and were entertained by the Americans. The Yunony left Winter Quarters Bay at 2.08 p.m. on her way back to Vladivostok by way of Singapore.

Classified as a naval research vessel the Admiral Vladimirsky, which was built in Stettin, is one of six ships of the Akademik Krylov class. Before her visit to McMurdo Sound she and another naval research vessel, the Thaddei Bellingshausen, were engaged in a project to determine the exact position of the South Magnetic Pole off the Adelie Coast of Wilkes Land.

ANARE REPORTS

Marine research and ice studies

Marine research in the Prydz Bay region to obtain more information about the biology of krill, and a glaciological traverse of more than 1500km from Casey to study the Antarctic ice cap east of the station, were two major projects in the 36th research programme of Australian National Antarctic Research Expeditions (ANARE) which ended this month. To deliver men and materials to the three continental stations, Casey, Davis, and Mawson, and the sub-Antarctic station on Macquarie Island ANARE used three chartered ships, Nella Dan, Nanok S, and Lady Franklin which made eight voyages between October and March.

ANARE relief and resupply operations for the 1982-83 season began on October 22 when the Nella Dan left Hobart for Macquarie Island with 52 passengers including 16 members of the 1983 winter party. She arrived on October 25, completed her mission by October 29, and was back in Hobart by November 2.

In Antarctica field operations began on August 29 when six men left Casey on a spring glaciological traverse. Their route ran 330km south of the station to 69deg S and then east to 138deg E 1200km from the station along the 2000m contour to a point due south of the French station, Dumont d'Urville.

One of the main objects of the programme was to measure snow accumulation and remeasure the position of ice movement markers along the route using satellite fixing methods. Ice markers number GD1 to GD12 were established in 1980 and 1981, and the traverse party planned to establish nine more markers numbered GD13 to 21 at 50km intervals after GD12.

BAD WEATHER

With a D5 tractor towing generator vans and sledges Damien Jones (glaciologist), Neil Smith (electronics engineer), Bob Goldsworthy (surveyor) and Paul Fiske, Greg Young and Gerry Hamilton (diesel mechanics) made slow

progress in the first month of their four-month journey. They encountered appalling weather — temperatures down to minus 52 deg Celsius, winds up to 60 knots, and sastrugi 1½m high. In September they reported from GD2 about 400km from Casey.

By November 16 the traverse team had started the journey back to Casey. It ended a traverse of more than 3000km on the evening of December 29. During the traverse remeasurement of the ice movement markers provided results which will be used to determine the speed and direction of movement of the ice cap. Measurements were also made of gravity and the earth's magnetic field.

Ice thickness radar was used during the traverse to obtain a profile of the land mass under the ice. Neil Smith, who operated the radar equipment, reported that the average thickness between GD3 and GD14 was about 2400m, and at one point the ice depth was around 3400m. The thickest known ice in Antarctica has a depth of 4776m.

KRILL BEHAVIOUR

New and valuable information about the behaviour of krill which will assist in the development of a management plan for the species was obtained by a marine science group which worked for three weeks in the Prydz Bay region during the Nella Dan's two-month voyage in

Antarctic waters between early November and late December. The main object of the project was to conduct additional research for the BIOMASS programme (Biological Investigations of Marine Antarctic Systems and Stocks) and follow up and extend findings made in Prydz Bay during the First International BIOMASS Experiment (FIBEX) early in 1981.

Results obtained from trawls and hydrocasts in the Prydz Bay region revealed that very large swarms of krill seem to inhabit the top few metres of water under the sea ice.

Later as the ice breaks up and melts the krill disperse into the water column and are found down to 100m or more. This behaviour was found to be related to the availability of the krill's food source.

When the Nella Dan left Hobart on November 8 to make the marine research cruise and deliver staff and cargo to Davis and Mawson she carried 54 passengers.

After reaching a point some 269 nautical miles north-east of Davis on November 22 the Nella Dan was forced by heavy pack ice to head north-west to a point about 539nm north of Mawson. She then headed south and arrived at the ice edge some 37nm north of the station on November 30.

Staff and cargo were flown ashore by helicopters, and the ship left for Davis on December 1. Difficult ice was encountered again and Davis was not reached until December 6. Staff and cargo were flown ashore, and the ship then continued her marine research work before heading for Hobart where she arrived on December 30.

Nanok S also encountered difficult ice on her first voyage south to Casey. She left Hobart on November 22 with 30 passengers. Six were administration officers and air crew, 10 were members of the Casey winter party, and 14 of the summer party. Of the latter seven were scientists and seven construction workers.

Although she had to push through some 80nm of pack the Nanok S reached

Casey on December 3 and tied up to the bollards on Nicholson Island. However, some 100m of fast ice remained between there and the station.

To unload the cargo the new motorised modular barge was loaded beside the ship and driven to the ice edge. From there the cargo was winched across the fast ice to shore on sledges. Some sledges were pulled by motor toboggans. By this method most of the cargo was unloaded.

Nanok S left Casey on December 6 and brought back six members of the 1982 winter team. She arrived in Melbourne on December 16. When she left Hobart on December 26 for Casey, Davis and Mawson, she was laden with more than 700 tonnes of pre-mixed dry concrete. This was for construction work at the three bases. Ninety-five per cent of her cargo was machinery and materials for the rebuilding programme.

Between early January and February the Nella Dan made two voyages — the first to Casey and Macquarie Island, and the second to Davis and Mawson. She ended her 1982-83 charter voyages when she returned to Hobart in the third week of March. Nanok S made her third and last voyage to Davis and Mawson in February-March, sailing from Melbourne on February 9. She left Davis for Hobart at first light on March 11 but in the evening reported that she was caught in the pack ice 14 nautical miles north-west of Davis.

Assistance was sought from a Soviet ice-strengthened ship but it was not expected to reach the Nanok S until March 26. Originally the Nanok S was expected back in Hobart on March 18.

After eight days the Nanok S broke free of the ice on March 19 and resumed her voyage to Hobart. She was able to force her way out when a heavy swell broke up the ice.

After a voyage to Dumont d'Urville in December and January for Expeditions Polaires Francaises the Canadian ice-strengthened cargo ship Lady Franklin made one voyage to Casey and Davis under sub-charter to ANARE. She left Hobart in the third week of January, and returned to Melbourne one month later.

New transport system for Australian bases

Australia plans to build three runways at its stations in Antarctica, Casey, Davis, and Mawson to support its summer research programmes. The new transport system, estimated to cost up to \$A100 million, will also include the acquisition of a specialised icebreaking marine research vessel, and the long-term charter of an additional cargo vessel to maintain the present logistics programme until the replacement system is completed in four to five years.

Plans for the new system were announced last month by the Minister for Science and Technology (Mr David Thomson). The use of aircraft to transport staff to Antarctica will require the construction of a compacted snow runway at Casey, a rock-based conventional runway in the ice-free Vestfold Hills a few kilometres from Davis, and an ice airstrip at Mawson. Environmental impact studies will be made to ensure that no harm will be done to the fragile Antarctic ecosystem by the construction of airfields.

Tenders for the design and construction of the specialised marine research vessel, expected to cost up to \$70 million, will be called in Australia and overseas. The vessel will be able to carry additional passengers and long-range helicopters to deploy field research parties to areas not accessible by fixed-wing aircraft.

Mr Thomson's announcement was made on February 11 only three weeks before the Australian General Election on March 5. Now Australia has a Labour Government and the Minister who had indicated that funds (\$4 million) would be made available for the new system in this year's Budget, has lost his seat. Reports from Australia since the election, however, suggest that support for Antarctic research will continue. The Labour Party is said to be strongly in favour of an increased research effort, and earlier promised a 300 per cent increase in funding.

Last year \$390,000 was allocated in the Budget for a transport study by the central office of the Department of

Science and Technology to indicate practicable alternatives to the present ship charter system. The study team also examined the feasibility of operating Royal Australian Air Force wheeled C-130 Hercules and Boeing 747 aircraft on routes to Antarctica, and light aircraft for flights between stations. West German ship design consultants, Schiffko, of Hamburg, who designed West Germany's new polar research ship *Polarstern*, were engaged to assist in the study.

After an examination of five ship and three air options the study team's estimates suggested that the multi-purpose ship would cost up to \$70 million, and the three runways up to \$35 million. It is hoped, however, to keep the total cost to \$60 or \$70 million. Tendering, designing, and building a new ship would take four to five years, and the contract would have to be completed by 1987 in preparation for the retirement of the *Nella Dan*.

Last season air transport investigations were made at Davis and Casey. A detailed study of the rock-based runway site at Davis were carried out by a soils physicist and a senior technical officer from the Department of Housing and Construction to assess the type of equipment and the engineering methods needed. This will enable an accurate estimate of the cost of a runway to be made for the first time.



David Lewis sails ship to Davis

Nearly two months after she sailed from Albany, Western Australia, the 21m auxiliary schooner, Dick Smith Explorer, arrived at the Australian station, Davis, on February 9. She left Sydney on November 14 for Prydz Bay, a deep embayment between the Lars and Ingrid Christensen Coasts of East Antarctica.

This winter and next summer an international group of four men and two women will carry out a scientific research programme from the ship which will be frozen in from April to November near the Rauer Islands in the south-east part of Prydz Bay. The ship will return to Sydney in March next year.

This expedition is the third Antarctic research expedition organised by the Ocean Research Foundation, and the leader is Dr David Lewis, the New Zealand navigator and ocean voyager who is now an Australian citizen. He led the 1977-78 expedition to the Balleny Islands and the Cape Adare region in the 17.3m yawl Solo, and the 1981-82 expedition which did research from the Dick Smith Explorer around Commonwealth Bay and off the French station, Dumont d'Urville.

An amateur radio operator, Don Richards, who was a member of the 1981-82 expedition, and is now a director of the ORF, was in touch with Davis on the evening of February 11. The second-in-command of the expedition, Mimi George, who is an anthropologist from the University of Virginia, reported that the expedition planned to make a helicopter reconnaissance of the Prydz Bay — Rauer Islands area as the islands were more accessible to Davis, and might provide a safer haven for the winter.

Early last month the Dick Smith Explorer was reported to be making slow progress through heavy pack ice about 100 nautical miles north of Davis. She entered the pack on January 27 and had a difficult time reaching Davis.

In a telex message to the Australian Antarctic Division David Lewis filled in the details. The Dick Smith Explorer became beset at 66deg 57min S/78deg

14min E when she had penetrated 68nm into the pack. In the early hours of February 6 the United States Coast Guard icebreaker Polar Star broke the ship out of the pack and escorted her to open water.

Good progress was made until the next day when the auxiliary engine was disabled because of a fractured oil pipe. The Soviet relief and supply ship Kapitan Markov diverted course and stood by while her helicopter flew a diesel mechanic from Davis to repair the engine.

For the last 24nm to Davis the Dick Smith Explorer followed a track broken through the ice by the Canadian supply ship Lady Franklin. She had been sub-chartered by the Antarctic Division from Expeditions Polaires Françaises for one voyage south to Australia bases.

Dr Lewis reported that the expedition planned to leave shortly for the Rauer Islands and the Larsemann Hills along the south-east shore of Prydz Bay which seemed relatively ice-free. He added that the only irreparable damage to the ship had been to the jury rudder. Staff at Davis had helped to make other repairs.

After the Dick Smith Explorer left Sydney on the 1800nm voyage to Albany she had to stop at Flinders in Westernport Bay on the Victorian coast for repairs to a generator. She left Flinders on November 23 and arrived at Albany on the night of December 7.

When a gale blew into King George Sound on the night of December 9 the ship had to be taken from her berth into open water. Some damage was done to the hand rails and the mast spreader before she could get clear of the wharf. There was a delay of two days for repairs, and finally the ship sailed on December 13, five days behind schedule.

Before the Dick Smith Explorer departed on the second leg of 1800nm to sub-Antarctic Amsterdam Island Nitish Iyengar, the 18-year-old Indian-born New Zealander from Wellington, who was the engineer and radio operator, left the expedition. He was replaced by Norman Linton Smith who made seven trips to Antarctica before he retired from Australian National Antarctic Research Expeditions in 1980 after 19 years' service.

Other members of the expedition are the 28-year-old Danish naturalist and wildlife photographer, Jannik Schou, not Schon as reported in the December issue of "Antarctic," Jamie Miller, a 25-year-old Australian biologist, and Gill (not Jill) Cracknell, a 24-year-old English geographer. She is a Durham University graduate, and has worked in the navigation section of the United Nations Intergovernmental Maritime Organisation.

From Albany the Dick Smith Explorer made good progress across the Southern Indian Ocean to Amsterdam Island where she arrived on January 7. Originally the third leg of the voyage was to have been another 800nm to the Kerguelen Islands. But after successful radio contact with Australia Dr Lewis decided to set course directly for Davis.

Chinese scientists winter at Davis and Casey

Two scientists from the People's Republic of China are in the winter teams at Casey and Davis this year. They are Mr Jiang Jialun, a biologist from the Second Institute of Oceanography, National Bureau of Oceanography, Qingdao, who is wintering at Davis, and Mr Quian Songlin, a glaciologist from the Lanzhou Institute of Glaciology and Cryopedology, Academia Sinica, who is at Casey.

Three Chinese scientists wintered at Casey, Davis, and Mawson last year and returned to Australia early this year. They were Mr Lu Peiding, a biochemist from the First Institute of Oceanography, National Bureau of Oceanography, Qingdao, who was at Davis, Mr Xie Zichu, a glaciologist from the Lanzhou Institute of Glaciology and Cryopedology, who worked at Casey, and an engineer, Mr Brian Lin'gen, of the Institute of Meteorology, Central Bureau of Meteorology, Beijing, who did meteorological research at Mawson.

A Soviet physicist is expected to winter again at Davis this year to continue a co-operative upper atmosphere

research programme of investigation of the Earth's southern magnetic cusp. He will probably arrive at Davis next month to replace Dr N. Voloshinov who has been there since April last year.

Peruvian Navy observer

A Peruvian oceanographer who sailed as an observer aboard the chartered Australian supply ship Nella Dan on her third voyage south in January will make a detailed report to his country's Antarctic organisation. It will form a basis for future representation and expeditions in Antarctica.

Peru, which acceded to the Antarctic Treaty in 1981, had two observers with the Chileans last summer. Lieutenant Hector Soldi, the Peruvian Navy representative with the Australians, observed oceanographic research during the Nella Dan's round trip to Casey and Macquarie Island. He also studied at the Antarctic Division in Hobart all aspects of preparation for an Antarctic expedition, including clothing, food, and medicines.

BAS NEWS

Geophysics team on Ronne ice shelf

Replacement of the present Halley geophysical observatory built in 1972-73 was the major logistic task of the British Antarctic Survey last season. The Royal Research Ship Bransfield took men and materials for the new station, which will cost 1.5 million sterling, in mid-December and remained off the Brunt Ice Shelf, Coats Land, until the beginning of March when the major construction work had been completed. Scientific programmes will be transferred to the new station next season.

In the 1981-82 season BAS had to cancel almost all its earth sciences programmes because of the loss of its two Twin Otter aircraft in a gale on Wiencke Island. Last season BAS began the first of several geophysics field programmes over the Ronne Ice Shelf which will use Rothera and Adelaide Island as the main operations base. In other programmes geologists worked on James Ross Island and north-eastern Palmer Island, and glaciologists were engaged in projects in George VI Sound, on Alexander Island, and in north-west Palmer Land. Air support was provided by the new Twin Otters.

With 740 tonnes of cargo aboard, some loaded on the way south, the RRS Bransfield left Southampton at the beginning of November and after calling at Ascension Island and Cape Town, to pick up more staff and air freight, proceeded direct to Halley. Heavy pack ice was encountered in mid-December at 68deg S/25deg W and a few valuable days were lost before the ship managed to reach a shore lead.

She arrived off Halley on December 19 and was able to moor against the sea-ice edge at a very convenient position, 2km from a snow ramp giving easy access to the top of the ice cliffs about 8km from the new site. (In some years the nearest suitable unloading site has been 40km from the base.)

Unloading of the 740 tonnes of cargo was greatly helped by good weather and all the building materials were ashore by the end of the month. The sea-ice was gradually breaking back but remained usable while the general cargo was unloaded.

Meanwhile, good progress was made with the construction of temporary accommodation at the work site. By the end of the first week of February all four of the inter-connected permanent wooden tubes were complete and weather-proof and work had started on the two-storey buildings being constructed inside them. Each of these will provide accommodation and laboratory space for 18 men.

While the Bransfield was at Halley 62 men were in the area, 19 living at the old base and the rest on the ship. The ship remained there until the beginning of March, by which time the major construction work had been completed. By early February, there was open water to the horizon in all directions, although there were a number of icebergs, so the Bransfield's return passage north was expected to be easy.

Old Halley Station, which has lasted 11 years, is situated on the moving ice of the Brunt Ice Shelf. The present buildings 24km from the new station,

are now under about 18m of snow, and are moving towards the ice edge. But in spite of the deterioration of the buildings the station is still operating excellently and will remain functional until next season when scientific programmes will be transferred to the new site.

Satellite communications equipment has now been installed to enable high-speed data transmission between computers. It also provides for voice, telex and facsimile transmissions. Identical equipment has also been set up at Signy station, South Orkney Islands, and both were operational by the beginning of February. These facilities will be extended to the other stations next season and the radio teleprinter link discontinued.

Before the Bransfield arrived at Halley the winter team had selected and levelled the new site, reconnoitred unloading sites and enjoyed the annual pilgrimage to the nearby Emperor penguin colony, as well as maintaining all scientific programmes. In November, four men also visited the Stancomb-Wills Ice Stream to the north, and another four re-established the route inland through the "hinge-zone" between the grounded and floating ice shelf.

SUMMER WORK

RRS John Biscoe arrived at Damoy air facility, Wiencke Island, on November 11 and landed 14 men who were later flown south to Rothera and summer field work sites. The ship proceeded to Faraday, a short distance further south down the west coast of the Antarctic Peninsula, and then turned north, calling at the Chilean Teniente Rodolfo Marsh Station, King George Island, before sailing to Montevideo by way of the Falkland Islands.

Men and stores taken on board at Montevideo for South Georgia were then ferried to the Bird Island biological station, arriving there at the end of November. Among the five men landed were two visiting scientists: Dr J. L. Bengston and his assistant D. J. Schneider (University of Minnesota). After collecting specimens and equipment from field work sites nearby on the mainland of

South Georgia, the ship left the area on December 5. A Royal Navy launch had previously delivered mail to Bird Island, and a helicopter had flown in one man and picked up another.

When the John Biscoe sailed for Signy she was held up by heavy pack ice extending 80km north of South Orkneys. Nearer the islands thick fog added to the hazards but the ship managed to reach the station after five days. Almost immediately she had to move out of Borge Bay to avoid being trapped but nevertheless was beset for two days before managing to reach the coast north of the bay. The station itself was reached on December 17 and unloading was completed in two days.

The ship returned to the Falklands for Christmas, and departed on December 30 for Rodolfo Marsh Station to rendezvous with a BAS aircraft from Rothera. Proceeding again to the west coast of the Antarctic Peninsula, the ship delivered cargo to Faraday. Further south fast ice blocked the approaches to Rothera, but after four days it had rotted sufficiently for John Biscoe to be able to reach the station and deliver four tonnes of fuel.

Back in the Faraday area in mid-January, the ship spent two days replenishing depots for field parties and called at the United States Palmer Station before returning to the Falklands. This was her final voyage before returning home — earlier than usual — as she is to undertake a winter Antarctic cruise this year as part of the long-term Off-shore Biological Programme. She called at Rio de Janeiro at the beginning of February and arrived at Grimsby on February 22.

AIR SUPPORT

Bad weather caused few interruptions to the two Twin Otter aircraft which had an excellent season.

Their first main task was to ferry summer field workers from Damoy, where they had been landed by the John Biscoe, to glaciological and geological work sites on Alexander Island and in central Palmer Land. The hut at Fossil Bluff in George VI Sound and field

depots had already been replenished. Further support was given to these parties throughout the next four weeks.

One aircraft then flew a three-man geophysics party to the Ronne Ice Shelf at the beginning of December. A depot which had been set up on the ice shelf by the Bransfield in 1980-81 was located, although covered by 2m of snow, and the contents were used to set up a series of small depots. The aircraft returned to Rothera on December 10. At about the same time, the second aircraft flew in a fourth man to join the Ronne Ice Shelf party and established additional depots.

This aircraft returned to Rothera by way of Fossil Bluff on January 8 and for the rest of the month supported the field workers on Alexander Island and in Palmer Land. An automatic weather station was set up on Larsen Ice Shelf in mid-February.

In mid-December the first aircraft began bird census flights from the South Shetland Islands and over the west coast of the peninsula near Faraday (counts were also made by boat parties from Faraday), as part of a long-term biological project. Combined aeromagnetic and radio-echo flights were undertaken from Rodolfo Marsh to James Ross Island, where geologists worked for a second season, and from Rothera to the Ronne Ice Shelf and Fossil Bluff. The second half of the month was devoted to geophysical flights over the Ronne Ice Shelf.

FIELD PARTIES

Last season's geophysics field programme over the Ronne Ice Shelf was the first of several planned with Rothera as the main operations base. The region is important as it is believed to hold much of the evidence critical to the understanding of the geological relationship between Greater and Lesser Antarctica.

Using depots set up by the Twin Otter aircraft, a four-man ground party was able to begin gravity, seismic depth-to-bedrock and radio echo sounding ice-depth measurements along reconnaissance traverses. Route-finding over the

featureless ice shelf was aided by a portable satellite navigation system.

At the same time, one BAS aircraft was also engaged in a systematic network of aeromagnetic and radio echosounding lines over the same region. The party was flown back to Rothera at the end of February.

There was three geologists in the field this season. Two of these a palaeontologist and a sedimentologist, with two assistants continued work on the fossiliferous sedimentary sequences of James Ross Island. The rocks are the exposed part of a basin or basins which probably extended along the eastern side of the Antarctic Peninsula during late Jurassic and Cretaceous times. The fauna is particularly important for determining the timing of the development of sea ways in the South Atlantic region as Gondwana began to break up.

ICE RADAR

A third geologist worked with an assistant in north-eastern Palmer Land (Mount Jackson, Welch Mountains and Giannini Peaks) and examined the structure of deformed metasedimentary rocks and foliated plutonic rocks. The results will contribute important information on the structural evolution of the Antarctic Peninsula.

Three glaciologists worked with assistants on Alexander Island and George VI Sound. One tested a new synthetic aperture radar (SAR) for investigating sub-ice morphology. Preliminary results from the previous short field season suggested that distortions caused by the ice can be corrected when producing an image of the backscatter from the bedrock. An operational SAR would enable greater lithological discrimination when attempting to map subglacial geology.

A second glaciologist working with an assistant recovered two oceanographic current meters deployed two years ago at the northern ice front of George VI Ice Shelf. Their data on current velocity, sea temperature and salinity covering just over a year complements earlier data over a five-month span in a study of the

interaction between oceans and ice shelves. Additional short-term data were collected at the northern and southern ice fronts last season.

Air and snow samples were collected by a third glaciologist in a variety of weather conditions to investigate how aerosols are incorporated into snowfall. The techniques employed were even more refined than those used previously and should allow shorter sampling times so that they match more closely with actual snowfall. This work was done on the Beethoven Peninsula in south-western Alexander Island and on the Fleming Glacier in north-western Palmer Land.

Geological and glaciological parties were flown back to Rothera in early March.

SHIP VISITS

In the 1981-82 season two Chilean Air Force Twin Otters brought a team to set up a temporary air facility at the Rothera airstrip in preparation for geophysical flights to Siple Station, and reconnaissance flights over Charcot Island south-western Alexander Island and the southern end of the Larsen Ice Shelf. Last season two Twin Otters flew from Rodolfo Marsh to Charcot Island by way of Rothera on December 9 and returned to Rodolfo Marsh the same way on December 14.

Then the Chilean encampment at the Rothera airstrip was evacuated for the winter. The Chilean Navy supply ship *Piloto Pardo* called at Rothera on February 8 to deliver fuel and collect Chilean equipment.

Research ships of Brazilian and West German Antarctic expeditions called at BAS stations during the season. The Brazilian ship *Barao de Tefe*, formerly the *Thala Dan*, was at Faraday in January 10-11.

West Germany's new research and supply ship *Polarstern* and the chartered *Polarbjorn* called at Halley. The *Polarbjorn* spent several hours alongside the *Bransfield* but a party on board was prevented by bad weather from reaching the station. The *Polarstern* arrived on

February 10 carrying two BAS men and urgently-needed cargo for Halley. A third BAS man, a chief officer of the *John Biscoe*, remained on the *Polarstern*.

Faraday had four visits from the cruise ship *World Discoverer*, the first on December 21-22 when 130 passengers went ashore, and the others on January 1, 14 and 26. The *Lindblad Explorer* visited Signy and Single Cove, Coronation Island, in the South Orkneys in late November and the middle of December, H.M.S. *Hecate*, a hydrographic survey ship, called at Signy and checked a field depot on nearby Coronation Island.

Onyx River's flow

Every summer Antarctica's only respectable river, the Onyx, flows westward for about 27km from the eastern end of the Wright Valley, into Lake Vanda. New Zealand hydrologists measure and record its flow each season as part of a monitoring programme in the dry valleys to document climatic conditions.

Last season the waters of the Onyx, one of the few rivers in the world to flow away from the sea, reached the permanent weir near Vanda Station at 1.30 p.m. on December 11. In the 1981-82 season the time was 11.15 a.m. on December 9, and in the 1980-81 summer when there was a cold spell the water arrived at the weir on December 14 at 2.52 p.m.

There is a financial interest in the flow of the Onyx each season because the New Zealanders at Vanda Station organise a sweepstake based on the time and date of the flow over the weir. Last season a Lands and Survey Department surveyor, Colin Fink, produced the closest forecast of the 35 received — 4.06 p.m. on December 10 — and won the prize. In the 1981-82 season the winner was Ross Manson, a technician with the winter team of Scott Base in 1982.

TAAF33

Katabatic winds study traverse

A 400km traverse from Dumont d'Urville to establish another automatic weather station in East Antarctica for the study of the katabatic winds which reach speeds of 250 to 350km in the coastal zone was the main project of the French summer research programme in Adelie Land last season. The traverse was a co-operative effort with United States scientists from the Universities of Alaska and Wisconsin whose katabatic wind programme has been co-ordinated for several seasons with the French IAGO programme for the study of interaction between the atmosphere, ice and ocean in East Antarctica.

To study the influence of katabatic winds in the coastal area the French have four IAGO meteorological stations on the Polar Plateau. These measure temperature, humidity, atmospheric pressure, and wind speed and direction. Data is transmitted by VHF radio to Dumont d'Urville, and selected material is passed on to France through the Tiros N-Argos satellite system.

Three United States automatic weather stations installed at distances of 10, 100, and 200 kilometres from the coast extend the chain of IAGO stations. Last season's traverse was carried out to instal a fourth station 400km from the coast at D80.

Members of the joint expedition were flown from McMurdo Station on December 24 by a United States Navy VXE-6 Squadron ski-equipped Hercules aircraft, which landed on the ice runway at D21 14km from the coast and 20km south-south-west from Dumont d'Urville. The team was flown back to McMurdo Station at the end of January.

Next season the IAGO programme will be suspended. The four automatic stations will be brought back for modifications in preparation for a joint IAGO-Antarctic Katabatic Winds programme in the 1984-85 season.

Experiments in the coastal region at the fixed station D10 were conducted last season by two meteorologists who

carried out ground and air measurements of the katabatic winds in January using radio-sondes. This project was conducted in preparation for the 1984-85 programme, and simultaneous measurements were made at the new American station at D80.

POLLUTION STUDY

TAAF33 began in the third week of October when the Canadian ice-strengthened supply ship Lady Franklin, chartered by Expeditions Polaires Francaises, (EPF) sailed from Le Havre for Hobart with stores and equipment. She left for Dumont d'Urville early in December with 51 members of the summer and winter parties who had flown from France to join the ship.

During the Lady Franklin's voyage from Le Havre by way of Panama five scientists took part in the OCEAT 82 programme — a study of natural pollution from the Atlantic and Pacific Oceans. They used gas chromatography to study the exchange of sulphur and carbon compounds at the interface of the ocean and atmosphere.

This project was carried out by chemists and computer engineers for the National Scientific Research Centre, and was supported by Expeditions Polaires Francaises. Samples of air and water were taken during the voyage for analysis to detect the level of natural pollution.

Scientific programmes at Dumont d'Urville during the summer and winter included geomagnetic recordings, seismological and meteorological measurements, ionosphere, auroral, and cosmic ray studies, and the photography of auroras in the blue spectrum region with a panoramic camera.

Biologists continued observations of bird and seal populations. They also studied the heat regulations of Emperor penguins during periods of sleep. This was to explain the mechanisms by which Emperors can reduce the flow of energy produced during sleep.

A physio-chemical study of ice to determine climatic variations was made by a glaciologist from the Glaciological Laboratory at Grenoble during the katabatic winds traverse to D80. Ice samples and measurements were taken on the profile of the International Antarctic Glaciological Project for 400km between D10 and D80.

AIRSTRIP PROJECT

After studies which began 16 years ago on the feasibility of building an all-weather airstrip in the Pointe Geologie Archipelago where Dumont d'Urville is situated on the Ile des Petrels, preliminary work began last summer on the scheme to join five small rocky islands — Cuvier, Lion, Pollux, Zeus, and Buffon. A civil engineering and construction team of 10 men worked on the largest island, Lion, and was supported by an engineer and three technicians who were responsible for the installation of equipment at Dumont d'Urville and on Lion.

In the 1981-82 season members of TAAF32 made topographical and bathymetric studies of Ile du Gouverneur, 3km from Dumont d'Urville, and other islands in the Pointe Geologie Archipelago, which had been considered in earlier studies. But the project started last season is designed to produce a rock-fill airstrip by cutting and removing some 450,000 cubic metres of material from the five islands and filling in the intervening shallow water segments.

An 1100m strip is designed to provide air connections between Hobart and Du-

mont d'Urville by a Transall C160 aircraft which can carry six tonnes of cargo from Australia. Completion of the airstrip is expected to take five summer seasons, and there have been estimates that the first 900m could be completed in three seasons. For a start the first stage could be used by the ski-equipped Twin Otter aircraft which EPF plans to buy for geophysical observations and biological studies along the coast, meteorological recordings on the ice-cap and ecological recordings of penguins and seals.

Lion Island, which is .32km north-north-east of Ile des Petrels, is the largest of the five. Cuvier is .16km long and .32km north of the west part of Ile des Petrels. Buffon, Pollux, and Zeus are three adjoining rocky islands about .4km in extent altogether. They lie .16km east of Ile des Petrels.

This winter there are 28 members of TAAF33 at Dumont d'Urville under the leadership of Claude Chaufrasse. There are 14 scientists whose fields of study include biology, the upper atmosphere, meteorology, and human biology.

Thirty-three men took part in the summer operations last season under the leadership of Robert Guillard. Three were Americans who took part in the katabatic winds programme. An Australian doctor, Dr John Aberdeen, went south in the Lady Franklin on her first voyage. Ten men worked on the airstrip construction.

Mid-Winter's Day

A combined function to mark Mid-Winter's Day will be held in Christchurch on Saturday, June 25. The function has been organised by old Antarticans and organisations with Antarctic interests, and will be run at the Brevet Club, Harewood, from 7.30 p.m. to 1 p.m.

Members of the New Zealand Antarctic Society, subscribers to Antarctic, and others interested can obtain tickets (\$16 single, \$32 double) from the secretary, Canterbury branch, P.O. Box 404, Christchurch.

SAE-28

New summer camp in Amery Ice Shelf area

A new summer base camp was set up on the shores of Beaver Lake in the Amery Ice Shelf area south of the Prince Charles Mountains by geologists and geophysicists of the 28th Soviet Antarctic Expedition (SAE-28) last season. Named Soyuz (Union) the camp at 70deg 48min S/68deg 20min E, is in a region where Australian geologists have discovered coal seams and Soviet geologists have reported rock formations with a relatively high iron content.

SAE-28 was the largest Soviet Antarctic expedition since exploration and research began in 1955. About 700 scientists and technicians took part, and nearly 350 remained to man the seven permanent coastal and inland stations this winter. Eight ships were used for research and transport, and more than 150 scientists and technicians were flown south to the main Soviet station, Molodezhnaya.

Soviet scientists worked at the permanent stations, Bellinghausen, Novolazarevskaya, Mirny, Leningradskaya, Russkaya, and Vostok on the Polar Plateau. With aircraft and helicopter support geologists worked on the Antarctic Peninsula from three summer camps on the Ronne Ice Shelf, Druzhnaya II, where the north-west edge of the shelf joins the peninsula, Shelf and Geolog, and the summer research station, Druzhnaya I, which was established on the Filchner Ice Shelf in December, 1975.

In East Antarctica glaciologists from Mirny continued Soviet participation in the International Antarctic Glaciological Project. Scientific traverses were made along the routes Mirny-Komsomolskaya-Dome B, and Mirny-Pionerskaya-Dome C. Information was collected from the automatic magnetic stations installed previously for long-term registration, films were changed, and the stations were set in operation again to record this winter.

In the Prince Charles Mountains area where the young rock of the Palaeozoic

and Pre-Cambrian periods meet geologists and geophysicists worked from the summer camp Soyuz on the shores of Beaver Lake. The lake is 27km east-south-east of the Aramis Range, the third range south in the Prince Charles Mountains. From their base camp the Soviet scientists were able to move to the area of the Lambert Glacier which flows north to the Amery Ice Shelf at the head of Prydz Bay between the Lars and Ingrid Christensen Coasts.

Beaver Lake is a smooth ice lake 11km long and 8km wide which was discovered by an Australian National Antarctic Research Expeditions team in 1956. An ANARE field camp was established nearby in September, 1957, and the lake was used extensively as a landing area by Beaver aircraft.

Coal deposits have been reported at numerous places in East Antarctica where the Permian sedimentary rocks are exposed, but almost all those known have a high sulphur and ash content, and are regarded as sub-economic. A rather better quality steaming coal occurs in Permian sediments near Beaver Lake. Sixty seams between 2.5 and 3.5 metres thick are known.

Australian geologists have reported a seam of high-grade coal near Lake Radok (70deg 52min S/68deg 00min E). This lake is 4.8km south-west of Beaver Lake and 24km south-east of the Aramis Range.

Work in the Weddell Sea last summer included seismic probes into sedimentary deposits on the seabed to study

Antarctica's underwater bonding with South America. As in past seasons the programme based on Druzhnaya I included geological and geophysical investigations, and topographic and geodetic work on the Weddell Sea coast and in adjacent mountain regions.

WEATHER SERVICE

Projects at the permanent stations last summer included ionosphere physics and radio wave propagation, atmospheric pollution, geomagnetic field variations, and examination of isotope particles of extra-terrestrial origin. Marine research covered oceanography, and the interaction of ocean and atmosphere.

As part of the international Poles-South programme in the Southern Ocean complex aero-meteorological and hydrological investigations were carried out between Africa and Antarctica. Hydrological, ice, and aero-meteorological observations were made also during operations in Antarctica waters. A meteorological service was provided again for ships of the Ministry of Marine fleet and the Ministry of Fisheries cruising in the Southern Ocean.

MAGNETIC POLE

Last season two new ships joined the Soviet Antarctic fleet. They were the naval research vessels Admiral Vladimirsky (9100 tonnes) and the Thaddei Bellingshausen (2674 tonnes). Early in December last year the two ships sailed from the Black Sea port of Sebastopol bound for the Indian Ocean sector.

A report from the Soviet news agency, Tass, said that the main purpose of the voyage was to determine the present position of the South Magnetic Pole which has now moved offshore from the Adelie Coast of Wilkes Land. Other projects included marine biology, seabed surveys, iceberg tracking, and improvement of Antarctic navigation charts.

Early last month the Admiral Vladimirsky made a brief visit to McMurdo Sound. During her stay the ship's Kamov 25 helicopter flew over McMurdo

Station, Scott Base, and the Williams Field ice runway facilities.

SAE-28 began operations in late October when the first party of summer scientists and technicians was flown south to Molodezhnaya in a specially-equipped Ilyushin-18D aircraft. The first shuttle flight on the 4900km route from Maputo, Mozambique, to the permanent airstrip near Molodezhnaya was made on November 1. There were 40 expedition members aboard and two Cuban scientific observers.

TRACTOR TRAIN

In the early part of the season the Il-18D delivered 120 members of SAE-28 and brought back winter members of SAE-27. The last flight was made early last month with 30 members of the SAE-28 winter team.

In November the first of the ships sailed from Leningrad to begin the relief and resupply of the six coastal stations. Vostok was supplied by tractor train from Mirny.

Twenty men of SAE-27 left Mirny on October 12 in 14 tracked vehicles. These towed sledges carrying food and other supplies, including 400 tonnes of fuel, for the 22 men who wintered at Vostok last year. The journey of 1450km was completed towards the end of November.

One of the last tasks of the Mikhail Somov, flagship of the Soviet Antarctic fleet, was to carry most of the 350 scientists and support staff to the stations for the winter. She sailed from the Soviet Union on February 10.

SAE-27 did not complete its 1981-82 summer programme until June last year when the Mikhail Somov and the tanker Urengoy returned home. The Mikhail Somov started the season early with the joint Soviet-United States polynya research project in the Weddell Sea in November, 1981. Later she resupplied four stations, Molodezhnaya, Mirny, Russkaya, and Leningradskaya. Some were visited twice.



MINERAL RESOURCES

Concern for protection of environment

Good progress towards the establishment of an agreed regime to regulate the orderly exploration and exploitation of Antarctic mineral resources in a safe and environmentally sound fashion was made by representatives of the 14 consultative parties to the Antarctic Treaty who continued discussions in Wellington from January 17 to 28. A preliminary framework for an agreement in which protection of the Antarctic environment and its dependent ecosystems must be a basic consideration was agreed on at a special consultative meeting in Wellington from June 14 to 25 last year.

This year's informal discussions will be followed by a second special consultative meeting in Bonn in July. The next stage will be to present a draft agreement for consideration and acceptance by the 12th Antarctic Treaty Consultative Meeting in Canberra from September 13 to 23.

Establishment of an Antarctic Commission to oversee the mineral resources regime and protection of the environment was discussed by the meeting. It also considered the setting up of a scientific, technological and environmental committee to provide advice and make recommendations to the commission.

Mr C. D. Beeby, Assistant Secretary, New Zealand Ministry of Foreign Affairs, who was chairman of the meeting again, issued a press statement which provided background to the decision by the Antarctic Treaty nations to produce the mineral resources regime. He explained after the discussions that the views expressed in the statement had been endorsed by the meeting.

This press statement made it clear that the discussions were designed to ensure that mineral resource activities in Antarctica would not be permitted unless they were fully consistent with the aim of protecting the environment and of preserving the international co-operation and harmony of the Antarctic Treaty system. The tenor of the discussions was outlined in more detail by Mr Beeby at a press conference.

Details of the proposed commission, such as how much power will be vested in it, and in the countries represented on it, voting systems, and funding, have still to be discussed. But Mr Beeby explained that the commission would be a body on which all parties to the Antarctic Treaty would sit. It would not necessarily be exclusive to the 14 consultative parties. (Twenty-six countries have now acceded to the treaty since it was signed in 1959).

Although there was a large measure of goodwill, flexibility, and a willingness to find common ground among the representatives, according to Mr Beeby, the area of greatest difficulty in the negotiations was to reconcile the positions of nations that claim sovereignty in Antarctica. These are Argentina, Australia, Chile, France, New Zealand, Norway and the United Kingdom. The other consultative parties do not recognise any claim or do not make any.

Mr Beeby said it was clear that the present discussions would not settle the sovereignty question. This was a central issue politically difficult to negotiate.

Commercial exploitation of Antarctica's mineral resources is unlikely to take place in a few years. Mr Beeby said that real interest in Antarctic mining was quite a way off, perhaps as much as 20 years. Technology needed to be developed, and the cost of producing oil would be very high.

Seventy-eight representatives, alternative representatives, and advisers, were present at the Wellington meeting. They represented the 12 original signatories of the Antarctic Treaty — Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, Soviet Union, United Kingdom, United States — and Poland and West Germany.

Two United States advisers were from the private sector. They were Ms Lee Kimball, Citizens for Ocean Law, and Dr Robert H. Rutford, formerly director, Polar Programmes Division, National Science Foundation, and president of the University of Texas at Dallas.

OIL EXPLORATION

An international environmental organisation, the Antarctic and Southern Ocean Coalition (ASOC) which represents 120 conservation groups, and seeks the complete and permanent preservation of Antarctica free from human exploitation, preferably as a world park, lobbied delegates from the 14 nations to advance its views. It released to the media a telegram from the wildlife authority and conservationist, Sir Peter Scott, in which he urged the meeting to consider the great scientific and aesthetic value of the natural ecosystem of Antarctica and the Southern Ocean as by far the most important factor in its deliberations.

Sir Peter Scott said in his telegram addressed to Mr Beeby that he was especially concerned because four nations — Japan, Australia, France, and West Germany — were already undertaking oil exploration in Antarctica in apparent violation on the 1977 Antarctic Treaty consultative meeting recommendation IX-1 (Para. 8) which read that no mineral exploration or exploitation should take place before the adoption of an agreed minerals regime. ASOC called on the meeting to respond to the telegram by giving reasons why the consultative parties were ignoring these apparent breaches of agreements they had made themselves.

Dr H. G. Sulima, head of the West German delegation, described the claims as wholly unfounded and untrue in their entirety. He said that the activities carried out by German institutions were of a purely scientific nature, and in full accordance with both the principles and objectives of the Antarctic Treaty and subsequent recommendations of the consultative parties.

Australia's Minister of Science and Technology (Mr David Thomson) also denied Sir Peter Scott's claims. He said that an Australian marine geoscience research programme to which Sir Peter Scott was apparently referring was definitely not an oil exploration programme but a basic part of Australia's ongoing Antarctic research programme. The data obtained was not sufficiently detailed for mineral exploration.

Earlier ASOC sent a letter to the head of the Japanese delegation, Mr Yoshihiro Jibiki, claiming that geological and geophysical surveys in the Ross Sea this summer by the research ship *Hakurei Maru* appeared to be a violation of Recommendation IX-1. Mr Jibiki replied that the *Hakurei Maru* had been dispatched to the Ross Sea purely for a scientific survey which was being carried out in conformity with the Antarctic Treaty and its recommendations.

French geophysical operations in 1981-1982 did not constitute exploration or development activities according to Mr N. Museux, leader of the French delegation. He said that none had caused any harm to the Antarctic environment.

Another issue raised by ASOC was the French plan to establish an all-weather airstrip near Dumont d'Urville Station by levelling five small islands. ASOC claimed that the project would interfere with the habitat of a least five species of Antarctic seabirds, and amounted to a contravention of the Agreed Measures for the Conservation of Fauna and Flora drawn up by the consultative parties in 1964. The coalition asked that the matter be placed on the agenda for the preparatory meeting of the Antarctic Treaty nations in Canberra next month.

Japan plans second oil survey programme

A second three-year programme of marine geophysical surveys in Antarctic waters is planned by the Japanese Agency for Natural Resources and Energy. The first programme which began in the 1980-81 season ended last month when the technology research centre of the Japanese National Oil Corporation completed the two stages of the 1982-83 survey, the first in the Wilkes Basin area of the Dumont d'Urville Sea off Adelie Land, and the second in the Ross Sea.

This year the Agency for Natural Resources and Energy intends to commission the Japan National Oil Corporation to make three surveys in the Australian and Norwegian sectors of Antarctica. The corporation will lease the Japanese Metal Mining Agency's geological survey ship *Hakurei Maru* again for the new survey programme.

So far the Agency for Natural Resources and Energy has spent about 1.8 billion yen on the first programme. This year it will lodge a budget request with the Ministry of Finance for upwards of .6 billion yen to finance the first of the next three surveys. Present plans are for the *Hakurei Maru* to investigate two areas off Australian territory in the summers of 1983-84 and 1984-85, and in the summer of 1985-86 it will move to the Norwegian sector.

A geological and geophysical survey

of an area of 700,000 km in the Bellingshausen Sea was completed in 1980-81 and was followed by a similar survey in the Weddell Sea in 1981-82. The Bellingshausen Sea results were published in "Antarctic Record No. 75" issued by the Japanese National Institute of Polar Research, and made available to interested organisations, including the New Zealand Department of Scientific and Industrial Research. Weddell Sea results are under interpretation.

Between late December last year and early February the *Hakurei Maru* worked in the Dumont de'Urville Sea area for a week, and then in the Ross Sea for 23 days. She called at Lyttelton on January 11 for fuel, supplies, and additional equipment, and sailed south again for the Ross Sea on January 15. Last month she left the survey area on February 12.

U.S. bases' winter population

Four United States bases in Antarctic will have a slightly smaller winter population this year. In 1982 there were 124 men and four women at the four stations; this year there are 117 men and six women in the winter teams.

There are 83 men and two women at McMurdo Station. Five, including one woman, are scientists, and 12 men and one woman work for the support contractors, ITT Antarctic Services. Sixty-seven are naval officers and men.

Once again there are two women in the winter team at the Amundsen-Scott South Pole Station 1327km to the south. Of the 20 members of the team eight are

scientists, and 12 are support staff.

Siple Station in Ellsworth Land, which was closed for the 1981 winter, has the same population as in 1982. There are three scientists, four support staff, and a United States Navy medical orderly.

Palmer Station on Anvers Island off the Antarctic Peninsula also has a small winter team — three scientists, six support staff, and one medical orderly. Of the three scientists two are husband and wife. Steven and Annette Waylette, of Washington State University, will spend the winter on an air chemistry monitoring project.

WEST GERMANY

Polarstern's maiden voyage to Weddell Sea

West Germany's new icebreaking research and supply ship *Polarstern* (10,000 tonnes), made her maiden voyage to Antarctica last season in support of the research programme in the Weddell and Scotia Seas, at George von Neumayer Station, and on the Filchner-Ronne Ice Shelf. The Alfred Wegener Institute for Polar Research also chartered the Norwegian Arctic research vessel *Polarbjorn* (497 tonnes) to exchange the winter teams at Neumayer Station, and then to serve as a support platform for geological and biological field teams operating in New Schwabenland.

A second expedition, *Ganovex III*, planned by the Federal Institute for Geosciences and Natural Resources (BGR) worked in North Victoria Land between early December and March. It used the chartered Norwegian Arctic research vessel *Polar Queen* and Canadian helicopters to continue the geological and geophysical surveys of *Ganovex II*, which had only started when the *Gotland II* sank in December, 1981.

In addition to their programmes in the Weddell Sea area and Queen Maud Land West German scientists took part in international projects with scientists from Britain, the United States, Chile, and South Africa. New Zealand, Australian, and American scientists took part in *Ganovex III*, and two biologists worked in the sub-Antarctic.

Twenty-one scientists and technicians, including a new winter team of nine men, sailed from Bremerhaven for Atka Bay by way of Rio de Janeiro on November 27 aboard the *Polarbjorn*. The ship, which is equipped for research in marine biology, and carries two helicopters, supported the New Schwabenland field parties from January 1 to February 10. She left Antarctica in mid-February, and was due back in Bremerhaven by way of Cape Town in mid-March.

Leader of the *Polarbjorn* expedition was Dr H. Kohnen, one of West Germany's most experienced Antarctic

geologists. His team included 10 scientists from four universities and the Alfred Wegener Institute, and an Austrian mountain guide.

Dr G. Hempel, director of the Alfred Wegener Institute, led the expedition aboard the *Polarstern*, which left Bremerhaven at the end of December. After a stopover at Cape Town the *Polarstern*, which also carries two helicopters, arrived in Atka Bay at the end of January.

Additional supplies were transferred at Neumayer Station (70deg 37min S/08deg 22min W) and the British Antarctic Survey station, Halley, on the Brunt Ice Shelf, Coats Land, and then the ship carried out a research programme in the Weddell Sea until the end of February. She left for the Antarctic Peninsula on March 3, worked in the Scotia Sea, and left Rio de Janeiro on March 24 for Bremerhaven where she was expected about April 24.

Most of the scientific and technical staff aboard the *Polarstern* were from the Alfred Wegener Institute and five universities. The team also included two women, Elizabeth Boysen, a biologist from the institute, and a Munich movie-maker, Angela Lutkemeyer. One of the three engineers was from the Dorsch Consult Co., which designed Neumayer Station.

A biological, oceanographic, meteorological, and geological programme was carried out by the *Polarstern*

expedition on the cruise legs between Bremerhaven and Antarctica, and in the Weddell Sea. Additional data was also collected on the ship's northward passage.

On the southward passage through the Atlantic Ocean a meridional cross-section of the vertical thermodynamic and kinematic structure of the atmosphere, the vertical distribution of temperature in the ocean, and various chemical components of the air were obtained for climatological studies.

In the Weddell Sea region and the Scotia Sea the biological programme concentrated on investigations of plankton and krill distribution, and on an inventory of various species of Antarctic fish. Intensive studies of seals and penguins were also conducted.

Oceanographic measurements were carried out to describe the oceanic mixed layer structure and the water masses in the Weddell Sea as well as to serve the biological programme. Meteorologists co-operated closely with oceanographers to study the air-sea energy and momentum exchange under different surface conditions, and the vertical structure of the atmospheric boundary layer.

Ship-borne methods were used in the geological programme. This covered investigations of the sediments of the Weddell Sea.

Main emphasis in the Polarbjorn expedition's programme was placed on geoscience activities. Projects undertaken in the Atka Bay and New Schwabenland areas covered geology, geodesy, glaciology, geophysics, meteorology, air chemistry, and drilling into the ice to a depth of 200m.

Summer biological work in Atka Bay included population studies of birds and seals, and pollutant and parasite investigations. Glaciological and geophysical studies were carried out on the Ekstrom Ice Shelf where Neumayer Station is situated, and in New Schwabenland.

Although Filchner Station (77deg 09min S/50deg 38min W), the summer camp on the Filchner-Ronne Ice Shelf was not opened last season, some scientific work was done there. It included

studies of ice movement by Doppler measurements, ice accumulation and its dependence on regional and climatic factors with particular attention to isotope methods.

When the summer season ended in early March nine men remained at Neumayer Station for the winter. The leader was the medical officer, Dr R. Hochgrebe, of the Alfred Wegener Institute. With him were two meteorologists and two geophysicists from the institute, and a support group of four provided by a Hamburg firm, Christiani and Nielsen — two engineers, radio operation, and cook.

Ganovex III, which left the New Zealand port of Wellington early in December aboard the chartered Arctic research vessel Polar Queen (1050 tonnes) worked first in the centre of the North Victoria Land area and the Lanterman Range as initially planned for Ganovex II. The ship was based in Yule Bay, and field parties worked from the Lillie Marleen Hut (71deg 12min S/164deg 31min E) at the foot of the Lillie Glacier near Mt Mulach in the Posey Range.

Detailed work related to the boundary zone between the East Antarctic Shield and the West Antarctic Fold Belts was continued in the Lanterman Range and the Bowers Graben, and their south-eastern extension to the Ross Sea. Geological mapping and sampling for petrographical, petrological, geochemical, palaeontological, geochronological, and palaeomagnetic investigations were carried out.

In January the Polar Queen began what was to have been the first phase of the expedition's scientific programme — geological work in the hinterland of Lady Newnes Bay on the Ross Sea coast. At the beginning of the third week the ship moved south to pick up Dr Tom Wright, of Allegheny College, one of the guest scientists who had been unable to join the expedition earlier because of commitments to the United States research programme.

When a United States Navy Hercules aircraft of VXE-6 Squadron flew north from McMurdo Station on January 21

to bring out a New Zealand Geological Survey team which had been working in the Terra Nova Bay — Inexpressible Island region of North Victoria Land Dr Wright was a passenger. The Hercules landed in the Browning Pass area behind the bay and Dr Wright was picked up by a helicopter from the Polar Queen.

During the expedition's stay in the Terra Nova Bay area in January and February its Hughes 500 helicopters performed a major logistic task — the transport of 150,000 litres of kerosene to a fuel depot in Gerlache Inlet. This will be used for an airborne geophysical research programme planned for the 1984-85 season.

Gerlache Inlet (74deg 41min S/164deg 06min E) where the expedition also built a new hut, is an inlet 6.4km wide in the north-west corner of Terra Nova Bay. It indents the Northern Foothills just south

of Mt Browning.

After 110,000 litres of fuel had been placed in the depot the Polar Queen moved north to the Coulman Island area to enable scientists to work round the south end of the Mariner Glacier. Early in February the expedition headed south again to complete stocking the Gerlache Inlet fuel depot. Because the helicopters were able to use fuel left behind by the Ganovex I expedition another 40,000 litres was available for the new base named Gondwana Station.

Withdrawal of field parties from North Victoria Land was delayed for a week by bad weather and the third phase of the research programme was not completed because of ice conditions and the lateness of the season. The Polar Queen left the Ross Sea area late last month and arrived in Wellington on March 7.

Minke whale assessment cruise

Scientists from six of the International Whaling Commission member countries took part in the fifth Southern Hemisphere minke whaling assessment cruise. From late December to February they spent two months in Antarctic waters working aboard three whale catchers, two from Japan and one from the Soviet Union.

An Australian biologist, Durant Hambree, formerly of the Western Australia Museum, Perth, who participated in the four previous cruises, led the 1982-83 cruise to survey Area I (60deg to 120deg W). New Zealand's representative was Paul Ensor, of Christchurch, who took part in the 1980-81 survey of Area V. The IWC project is part of the International Decade of Cetacean Research (IDCR). Other countries represented were Japan, United States, Soviet Union, and Argentina.

With experienced whaling crews aboard the three catchers sailed from the Argentine port of Ushuaia, Tierra del Fuego, at the end of December. They cruised westward both along the edge of the pack ice and offshore, and then arrived in Wellington, New Zealand, late

last month.

Although detailed information was gathered on all other species of cetaceans sighted, the main purpose of the cruise was to obtain accurate scientific data on the numbers of minke whales in the Antarctic region by a programme of large-scale sightings and marking. Minke whales were first caught on a large scale during the 1971-72 Antarctic season. Since 1979 they have been the only large whales that can be caught by pelagic whaling fleets under IWC regulations.

Minke whale statistics were first compiled in the early 1970s but the means of analysis at that time provided inadequate. A decline in minke whale population was detected in the mid-1970s in Area IV (70deg to 130deg E).

GANGOTRI II

India plans permanent base in 1985

India plans to continue its annual expeditions to Antarctica until 1985. Dr S. Z. Quasim, Secretary of the Department of Ocean Development, who led the first expedition in 1981-82 says that then a permanent station will be built in Queen Maud Land and manned all the year round.

Operation Gangotri, the first expedition, which cost about \$US 2.1 million, built a base camp on the Prince Olav Coast at 69deg 59min S/11deg 07min E, and established a solar-powered unmanned weather station named Dakshin Gangotri 80km to the south. Operation Gangotri II, which cost about \$US 3.5 million, retrieved data from the weather station, erected two huts at the site which is in an ice-free area, and marked out a 3048m runway on the ice. The expedition returned to Goa late this month after two months on the continent.

Planning for Operation Gangotri III has begun already. India has chartered the Norwegian research vessel Polarsirkel for the first two expeditions. Now discussion has begun on whether an ice-breaker should be bought or built in an Indian shipyard. There have been reports that India planned to buy six Lockheed Hercules transport aircraft, three of them ski-equipped, for Antarctic operations.

Organised by the Department of Ocean Development Operation Gangotri II took six months to prepare. According to Indian reports after the Polarsirkel sailed from Goa on December 1 last year, Norway was the only country to know officially that India was sending a second expedition south. The Norwegian Government was informed because the expedition, like its predecessor, intended to work in Queen Maud Land which is in the sector claimed by Norway.

When the Polarsirkel sailed she carried two French-built Alouette helicopters provided by the Indian Navy, two motor toboggans, and a tracked snow vehicle, as well as two prefab-

ricated all-weather huts, and equipment for geological and meteorological projects. Leader of the expedition was Dr V. K. Raina, of the Geological Survey of India. His team of 27 included nine other scientists from several research institutions, about 15 officers and men from the Indian Navy to provide logistic support, and a Films Division cameraman.

Operation Gangotri II landed on the Prince Olav Coast towards the end of December. The expedition's first task was to erect the two huts at Dakshin Gangotri. For the journey south these had been divided into 400kg packages for transport by helicopter from the base camp on the coast.

Designed by the Central Building Research Institute at Roorkee, and built by various manufacturers at the Okhla Industrial Estate in New Delhi, the huts each weigh 3.5 tonnes. They are made of aluminium, and are insulated with a combination of fibreglass and thermocol to withstand temperatures as low as minus 80deg Celsius. As Dakshin Gangotri is in an area surrounded by hills free of ice the huts were set in rock and not ice and snow.

Engineers with the expedition then had a more difficult task to perform. They had to mark out the 3048m runway, using powder dyes on the snow to define its limits.

A communications unit built by the Indian electronics firm was installed by the second expedition. It enabled the Prime Minister (Mrs Gandhi) to talk direct from New Delhi by radio telephone to Dr Raina and his colleagues.

Cubans raise their flag in Antarctica

Cuban scientists may work in Antarctica with their Soviet counterparts some time in the future. Before two Cuban geographers visited Molodezhnaya, the main Soviet station, last November, Fidel Castro saw them in Havana and discussed the possibilities that their trip opened for Cuba in the field of science.

When members of the 27th Soviet Antarctic Expedition (SARE-27) at Molodezhnaya celebrated the 65th anniversary of the Bolshevik Revolution on November 7 Dr Antonio Nunez Jimenez and Angel Grana Gonzalez, research assistant at the Institute of Geography, Academy of Sciences, Cuba, raised the Cuban flag next to the flags of the Soviet Union and the German Democratic Republic. On the flag's single star Castro had written: Fidel Castro Ruz, October 23, 1982.

Ten years earlier Dr Nunez Jimenez had hoisted the Cuban flag at the Soviet North Pole Station 19. He was invited to join the Soviet expedition by the late Evgeni Konstantin Feodorov, president of the Soviet State Committee for Hydrometeorology and the Environment. In 1981 he was invited by Feodorov's successor, Dr Yuri A. Israel, to visit Antarctica.

Dr Nunez Jimenez wrote a long article about the Cuban's Antarctic visit for "Gamma," the Cuban Communist Part newspaper. The paper's 12-page weekly review of December 26, 1982, is entirely devoted to the visit, and includes 28 photographs.

On October 28 the Cubans left Moscow aboard an Aeroflot TU-154 of the regular service to Maputo, capital of Mozambique. The aircraft stopped at Simferopol, near Odessa, Cairo, Djibouti, and Dar-es-Salaam. In Maputo the Cubans joined 40 members of SARE-27 for the 4900km flight by an Il-18 to Molodezhnaya on November 1.

When the Il-18 prepared to land Dr Nunez Jimenez noted that the compacted snow runway 13km from Molodezhnaya ran between a row of pine-

wood markers and polar boots that gave the impression of hundreds of men buried headfirst in the snow. A Soviet weather rocket specialist, Nicol Muravkhev, explained that when participants in an expedition were replaced they left their worn-out black boots to mark the runway because they contrasted very well against the snow.

First to greet the Cubans was 56-year-old Dr Rurik Maximovich Galkin, leader of SARE-27. He has made five trips to the North Pole for the Arctic and Antarctic Institute, Leningrad, and three to the Antarctic, including a year at the Amundsen-Scott South Pole Station as the Soviet exchange scientist in 1978.

As visitors the Cubans were welcomed at Molodezhnaya with the traditional bread and salt. In front of the welcoming expedition members was a cook dressed in white, wearing his tall cap and holding a bonnet-shaped loaf of black bread and a saucer of salt. Dr Galkin invited the visitors to accept the cook's offering which they did.

Molodezhnaya is located on coastal hills at 67deg 40min S/45deg 50min W. It consists of 58 cabins and huts, some of which accommodate the staff of 125. The others are used for station facilities. Meat and foodstuffs are stored in a tunnel excavated in the hard igneous rock of a hillside which has a permanent temperature of 14deg Celsius.

Dr Nunez Jimenez was impressed with the range of food provided at Molodezhnaya. He says in the article that several times a year Soviet ships on their way south pick up all sorts of products for the stations when they call at Australian and New Zealand ports. Aircraft also bring tropical fruit from Mozambique once or twice during the summer season.

Dr Galkin's aide, Vladimir Andreyevich Krasnov, who acted as "house commander," was able to provide canned sliced pineapple from Vietnam, fresh papaya or melon from Mozambique, and honey from Bashkiria. Dr Nunez Jiminez says he also seemed to have an endless supply of Bulgarian canned tomatoes, Australian potatoes, Indian tea, and walnuts and hazelnuts from Soviet Asia.

There was more to drink than vodka. Krasnov offered a choice of Armenian brandy, white and red Georgian wines, Russian vodka and champagne, and New Zealand beer. Krasnov also suggested black balsam from Riga which he was quoted as saying "gives you energy for everything".

During their stay at Molodezhnaya the Cubans visited the communications centre, the weather rocket and radar stations, the geophysical station, and the emergency runway 250m above sea level on the coast. They also studied Adelie penguins and elephant seals.

On November 5 the two men travelled eastward in a tracked vehicle by a winding route of 25km to an icefree oasis known as Twilight Hills. These hills rise gently to a height of 272m. Dr Nunez Jiminez, who has a degree in geographic sciences, gathered a collection of Antarctic rocks, including gneiss, mica, quartz and garnet.

After the celebration of the 65th anniversary of the Bolshevik Revolution Dr Galkin handed to Dr Nunez Jiminez the commemorative medal of the 25th Soviet Antarctic Research Expedition and the accompanying certificate from the Arctic and Antarctic Institute for presentation later to Fidel Castro. Other gifts for the Cuban leader included a large chunk of Antarctic rock from Dr Galkin, and cans of beer, preserved fruit and tea from members of the expedition.

Early on the morning of November 9, the day before they left Molodezhnaya for Maputo, the Cubans visited Garnet Point, a rocky zone about one kilometre from the station. There they completed their rock collection and finished their studies of the effects of the environment on the rocks. Black garnet, quartz and

other minerals similar to those studied on the Twilight Hills predominate in the area.

After a short stay at Maputo where they learned of Brezhnev's death Dr Nunez Jiminez and Grana Gonzalez returned to Moscow on November 13. They were present for the burial of Brezhnev, and returned to Havana on November 17.

On the day before they left Dr Yuri Israel presented Dr Nunez Jiminez with the medal of SARE-25. He and Grana Gonzalez also received the insignia of Soviet explorers in Antarctica.

Survival course at Siple

Eight men of the winter team at Siple Station in Ellsworth Land attended a snowcraft and survival course conducted there last season by New Zealand mountaineers. They were among 430 men and women who took part in the Antarctic Division's basic course which were run from early October until late January.

Last season's courses were run from Scott Base by Andrew Smith (field leader), Lindsay Bell and Philip Austin (field assistants). For the first time since 1973 the New Zealanders were assisted by a United States mountain instructor, David Lasorsa. When Andrew Smith returned to New Zealand Tony Parker joined the team.

In the 1981-82 season 380 people attended the courses. The attendance of 430 last season was the largest since the courses began. Training was given to American and New Zealand research and support staff, guest scientists from Japan and Australia, and New Zealand catering staff at McMurdo Station. Others in the courses were United States air crew, and the crews of Royal New Zealand aircraft.



SUB-ANTARCTIC

Heard Island team climbs Big Ben

Mountaineers from one of two private Australian expeditions on Heard Island made the first ascent in 18 years of Big Ben, the island's 2743m active volcano, early last month. The mountain was first conquered by three New Zealanders and two Australians in January, 1965. ("Antarctic," December, 1982).

Heard Island in the Indian Ocean 4000km south-west of Perth is one of the world's most isolated sub-Antarctic islands. Between late January and early March its isolation was disturbed by 36 men and women, among them scientists, mountaineers, and amateur radio operators, in the two expeditions. They were engaged in various projects, including the attempt to climb Big Ben, and communications with other radio "hams" all over the world.

Big Ben's crest is a filled-in volcano crater surrounded by blizzard-shrouded peaks of which Mawson Peak is the highest.

Both expeditions had teams of amateur radio operators at work on the island last month but news of their activities has been in inverse proportion to the vast amount of media publicity given to them before they sailed. The first expedition sailed from Fremantle on December 31 aboard the 25m ocean-going ketch *Anaconda II* which reached Heard Island by way of St Paul and Amsterdam Islands, and the Kerguelen Islands. It was followed on January 7 by the second expedition which left Hobart in the converted whale chaser *Cheyne II*.

Soon after the *Anaconda II* arrived at Heard Island late in January the mountaineering section began preparations for the ascent of Big Ben from the unknown northern side. A Perth report on February 6 stated that the party had left its base camp in Spit Bay early in the week to begin the ascent. Its planned route was by way of the Stephenson Glacier and over Long Ridge to the summer plateau, and then 500m to the summit of Mawson Peak.

Australian newspaper reports last month gave little information on the ascent of Big Ben. The first on February 10 quoted Dr Ross Vining, co-leader of the expedition, as saying that fabulous gales had marked the very difficult ascent by an unclimbed face. Another report on February 13 from the expedition's radio contact in Perth also referred to bad weather.

A third report in a Melbourne newspaper on February 15 also referred to very bad weather on the mountain until the last two days of the climb. No details were given of how many or which members of the expedition had made the ascent. Mrs V. Blunt, mother of the other co-leader, was reported as saying she believed two women were in the climbing team.

Scientists and radio operators were reported to have camped in three French-built huts erected in Atlas Cove by a French-Australian expedition in the summer of 1971. Some 17,000 contacts with "hams" round the world had been made by the radio operators. The *Anaconda II* which had been at the western end of Atlas Cove was to have sailed to Spit Bay at the weekend.

Organised by a Sydney architect, mountaineer, and photographer, William Blunt, and a medical research scientist, Dr Ross Vining, the Anaconda II expedition of 15 included two women, Blunt's wife, Meg Thornton, and Pauline English. Anaconda II was sailed by her South Australian owner, Josko Grubic, and a professional crew of three.

Chartered by the Heard Island DX Association, a group of amateur radio operators, the Cheynes II, now owned by the Commonwealth Scientific and Industrial Research Organisation, took 14 men and three women on the 5700km voyage south. The expedition, led by Jim Smith, owner of a Norfolk Island electronics firm, included amateur radio operators, scientists, and mountaineers with representatives from Norway, Australia, Austria, the Netherlands, Scotland, England, and the United States.

Three scientists and a research assistant from the University of New England at Armidale, New South Wales, and a veterinary surgeon from the Victorian Department of Agriculture took part in the expedition. Two had worked

previously at Australian Antarctic and sub-Antarctic bases.

Professor H. Heatwole's project was to make the first detailed study of micro-organisms on Heard Island. He and his research assistant, Mrs Dominique Ward, planned to collect and freeze soil samples containing algae, yeasts, bacteria, and fungi, for later study. The results will be compared with similar studies made by Professor Heatwole at Casey in 1978.

Dr Jeremy Smith, who is a botanist, intended to study the island's vegetation, and the zonation patterns of intertidal animals on rocky seashores. This work was to be done with Dr R. D. Simpson, of the zoology department, who studied the intertidal ecology of Macquarie Island for a year.

A study of the incidence of influenza, psittacosis, and Newcastle disease in the Heard Island penguin community, was planned by the veterinary surgeon, Dr Robert Jones. He hopes to obtain more information to test a theory that the influenza virus affecting humans is a combination of a human virus and an animal virus carried by birds.

Polish winter team at Arctowski

Nine Polish scientists and technicians wintered last year at Arctowski Station in Admiralty Bay on King George Island, South Shetlands. The team, led by Dr Ryszard Wroblewski sailed from Gdynia aboard the salvage tug Neptune early in February last year and returned to Poland last month.

Dr Wroblewski's research workers were another biologist, Krzysztof Zielinski, Andrzej Bortkiewicz (geophysicist), Dr Pawel Symonowicz (medical doctor and human physiologist), and Jan Grabiec (meteorologist). The deputy leader for technical affairs was an engineer, Bogdan Zielinski. In his team were Jan Swolek (mechanic), Donat Rzazewski (radio operator) and Andrzej Lewandowski (cook).

Science programmes were part of the

Polish National Polar Research Project administered by the Polish Academy of Sciences. Institutions engaged in last winter's programme were the Institute of Ecology, Institute of Geophysics, and Military Institute of Aviation Medicine.

Ecology projects were: investigation of benthic macro-algae distribution and their role in the near-shore ecosystem; and investigation of fish fauna taxonomy and physiology, and the role of fish organisms in the ecosystems. During the winter the station doctor studied the mechanisms of the physiological adaptation of men to polar conditions.

Continuous recordings were made of seismic activity at the station, and variations of the Earth's magnetic field. The meteorologist made regular surface synoptic observations.

TOURISM

Two ships cruise in Ross Dependency

Two Antarctic cruise ships made cruises to the Ross Dependency last season. The Lindblad Explorer and the World Discoverer left Punta Arenas, the Chilean port of Tierra del Fuego, in the third week of January, and ended their Antarctic and sub-Antarctic cruise programme at the New Zealand port of Bluff in the middle of last month.

Between November and January the Lindblad Explorer made three voyages to Antarctica, not four as originally planned. The World Discoverer made four cruises which concentrated on the Antarctic Peninsula area. Both ships followed much the same pattern on their Ross Dependency cruises — calls at McMurdo Station and Scott Base, Cape Hallett, Campbell Island and the Auckland Islands.

On its second cruise between December 3 and December 26 the Lindblad Explorer sailed to the South Sandwich Islands north of the Weddell Sea, and made calls at Zavodoski, Candlemas, and Saunders Islands in the northern part of the group. Zavodoski Island, discovered by Bellingshausen in 1819, is a circular island 4.8km in diameter, and is surmounted by an active volcanic cone rising to 490m.

Before the Lindblad Explorer sailed for the Ross Dependency from Punta Arenas on January 20 she cruised in the Antarctic Peninsula area and her 92 passengers were able to go ashore at Polish, Argentine, British and United States bases. In the South Shetlands she called at Nelson Island, and two visits were made to the Polish Arctowski Station in Admiralty Bay on King George Island.

From King George Island the Lindblad Explorer, sailed through Antarctic Sound to the islands north of the Trinity Peninsula, and called at tiny historic Paulet Island. This island is where 20 men from Nordenskjöld's expedition spent the winter of 1903 after the former

Norwegian whaler Antarctic became beset in the pack ice and sank several weeks later.

Next on the Lindblad Explorer's programme were calls at Deception Island, Anvers Island, and Paradise Bay where the tourists visited the Argentine Almirante Brown Station. Before she headed for the western Ross Sea the ship called at the British Antarctic Survey base Faraday in the Argentine Islands.

By the first week of February the Lindblad Explorer was off Ross Island, and on February 6 passengers went ashore at Cape Bird, the northern tip of the island. Then between February 8 and February 10 before heading north the tourists were able to sail into New Harbour across McMurdo Sound, visit McMurdo Station and Scott Base, and go ashore at Cape Evans and Cape Royds to inspect the historic huts built by Scott and Shackleton. Each hut had 120 visitors from passengers and crew.

On the way to Cape Hallett the ship called at Franklin Island early on the evening of February 10. She was there between three and four hours, and passengers made the first tourist landing on the island.

A New Zealand research team which worked at Cape Hallett last season was still there when both the Lindblad Explorer and the World Discoverer called on February 12. Two women in the team, Jeni Bassett and Linda Logan had plenty of feminine company among tourists from the two ships.

After a day and a night at Cape Hallett — the World Discoverer with 89 passengers stayed only two hours — the Lindblad Explorer headed for Cape Adare. Heavy surf off Ridley Beach stopped the Zodiac rubber boats from landing passengers. One boat managed to get within 20m of the beach.

On the sub-Antarctic section of the cruise the ship called at Campbell Island,

Enderby Island, and Auckland Island. By arrangement an extra call was made at the Snares on February 20, to pick up a University of Canterbury research team of four which had been there more than two months. After calling at Stewart Island the next day the Lindblad Explorer ended her cruise at Bluff where she arrived at midnight.

A day after the Lindblad Explorer's departure from Punta Arenas the World Discoverer began the last of her four cruises. She called at Deception Island on the same day as the other cruise ship, and like her visited Faraday and the United States Palmer Station on Anvers Island.

By February 8 the World Discoverer was also in McMurdo Sound, and her passengers were taken ashore to visit the historic huts. After her call at Cape Hallett the ship headed for Campbell Island, arriving the same day as the Lindblad Explorer. She also called at the Auckland Islands before sailing on to Bluff.

No calls were made by the two ships at

Macquarie Island as indicated in the September issue of "Antarctic." Because of the increasing number of ships calling there the Australian health authorities did not waive regulations requiring passengers to go through customs and health inspection at a Tasmanian port as they had done for previous expeditions.

As there are historic sites, specially protected areas, and sites of special scientific interest in Antarctica it has become necessary to control and monitor tourist activity which has increased in the last 15 years. Therefore the Lindblad Explorer and the World Discoverer carried New Zealand guides on last season's cruises in the Ross Dependency.

One of the guides was Mr Colin Monteath, field operations officer for the Antarctic Division, Christchurch, who joined the Lindblad Explorer at Punta Arenas. Mr David Bamford, a ranger from the Lands and Surveys Department, Wellington, joined the World Discoverer in McMurdo Sound.

New Zealanders worked with Dr Gressitt

New Zealanders who worked in Antarctica during the early 1960s with Dr J. Linsley Gressitt will be saddened by the news of his death on April 26 last year. He and his wife Margaret were killed in an aircraft crash in South China.

Between 1960 and 1965 Dr Gressitt led several entomological expeditions to Antarctica for the Bernice P. Bishop Museum, Honolulu, where he was senior entomologist at the time of his death. In the 1962-63 summer he also took part in a New Zealand expedition to the Auckland Islands which included Australian, British, and United States scientists.

When Dr Gressitt first went south he headed a project on the dispersal and distribution of insects in the Pacific and the Southern Ocean sponsored by his museum. Some of the New Zealanders

who worked with him later were responsible for gathering insects on voyages from New Zealand, using flying nylon nets of very fine mesh. Later expeditions did entomological research at Cape Hallett and in the mountains of Antarctica.

Six New Zealanders took part in expeditions sponsored by the Bernice P. Bishop Museum. Of these the veteran was K. A. J. Wise (Keith) who spent five consecutive summers in Antarctica mainly on museum projects. In 1964 he and an American scientist J. Shoup found mites only 497km from the South Pole on the Robert Scott Glacier in the Queen Maud Range. The other New Zealanders who worked on Dr Gressitt's project were R. Buchanan, C. E. Fearon, J. C. M. Mather, A. V. Spain, and O. R. Wilkes.

In 1967 Dr Gressitt edited Volume IX in the Antarctic research series which was devoted to the entomology of Antarctica. He was also editor or co-editor of museum monographs on sub-Antarctic and far southern entomology; and

the entomology of the Aucklands and islands south of New Zealand (Campbell, Snares, Bounty, Antipodes). The third monograph was based on work done by New Zealand expeditions in 1963 and 1966.

ANTARCTIC BOOKSHELF



Manuscripts in the Scott Polar Research Institute, Cambridge, England. A catalogue.

Edited by Clive Holland.

Garland Publishing, New York & London, 1982. 830pp, \$US100.

Take all the manuscripts gathered by the Scott Polar Research Institute since its foundation in 1920, add references to all similar records held elsewhere and known to the institute, and apply professional cataloguing procedures. The result is not only a catalogue, but an intriguing and enticing record of two centuries of polar exploration and personalities.

Edited by the Curator of Manuscripts, Scott Polar Research Institute, this publication follows soon after the institute's library catalogue, which now covers an astonishing 24 volumes with nearly 400,000 entries. The manuscript catalogue will be an essential acquisition for all libraries and institutions with an interest in the history of exploration.

An index of expeditions and voyages is cross-referenced to the main catalogue, and provides an invaluable aid to the researcher. It is also a unique record of more than 170 Arctic expeditions and voyages, 78 Antarctic expeditions and voyages, plus numerous sealing and whaling expeditions (both Arctic and Antarctic), listed decade by decade from the early 19th century.

In 1823, Messrs Enderby and others gave an opinion of the "very great advantage which we think those ship owners who send ships to fish for whales off the coast of New Zealand will gain by the establishment of settlements on that Island."

Predictably, the British Antarctic expeditions account for much of the

material, which includes 1839 to 1843. Of course, not all of it is specifically polar. One letter from George Ross, father of the explorer, gives a receipt for "the Negro Chalmers" belonging to his brother. There is an abundance of material from Scott, and many of his expedition members, particularly Cherry-Garrard and Edward Wilson.

As the catalogue is not limited to manuscripts held at the institute, it certainly forms the basis, if not the reality, of an international catalogue. Among the Australian and New Zealand institutions listed are the Mitchell Library, Sydney and the Turnbull Library, Wellington.

The value of the catalogue is enhanced by the recording of items, the whereabouts of which are unknown (when they have been sold privately) and even items which no longer exist, such as the diaries of J. B. Adams, of Shackleton's expedition 1907-09, and of A. Stevens, of Shackleton's Ross Sea Party 1914-17. Both these diaries were lost by enemy action during the First World War.

It is noticeable and understandable that more recent events, such as the Commonwealth Trans-Antarctic Expedition of 1955-57, are less represented than earlier events. This timely publication may help to increase awareness of the value in (expedition journals, field notebooks, explorers' official and private correspondence, and other genuine) manuscripts being made over to the Scott Polar Research Institute or other recognised institutions.

R. G. McELREA

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 nations at work in the far south. It has a worldwide circulation.

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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.

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