

ANTARCTIC

A NEWS BULLETIN
published quarterly by the
NEW ZEALAND ANTARCTIC SOCIETY (INC)



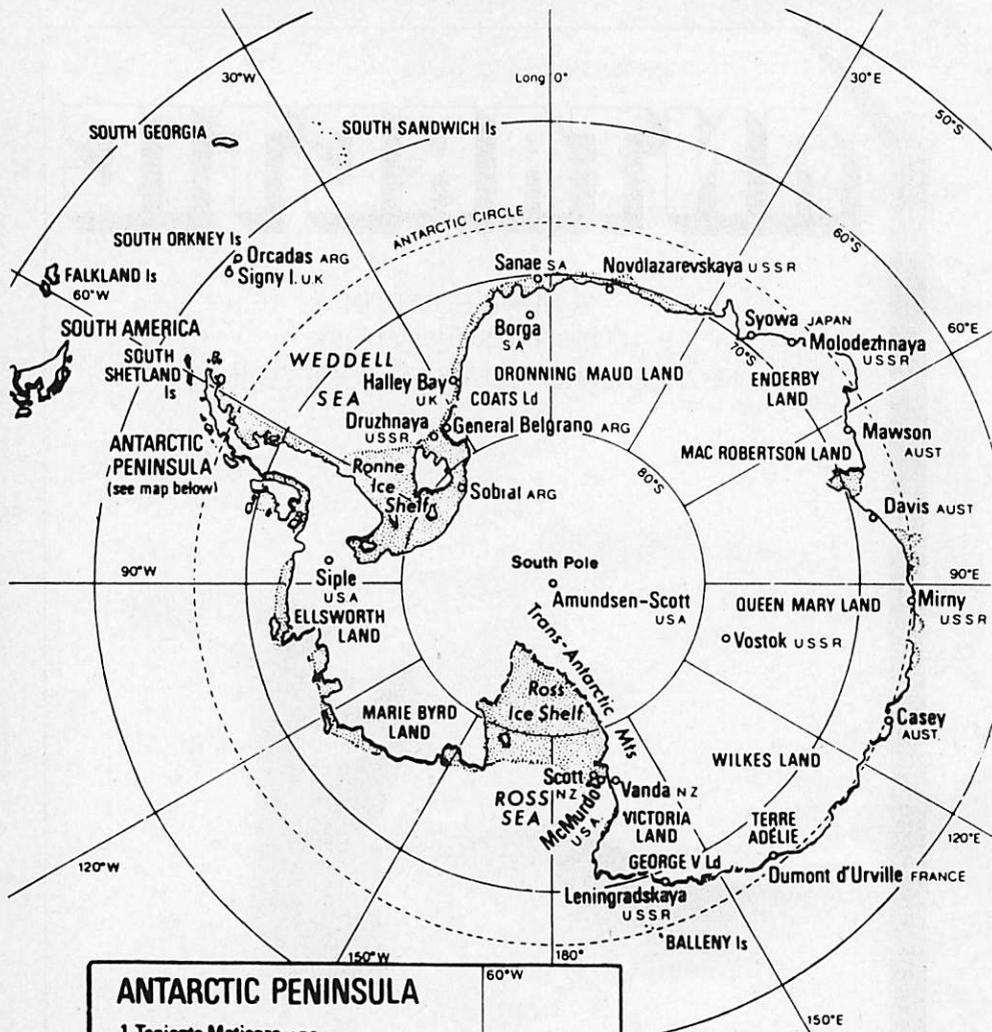
An English-born Post Office technician, Robin Hodgson, wearing a borrowed kilt, plays his pipes to huskies on the sea ice below Scott Base. So far he has had a cool response to his music from his New Zealand colleagues, and a noisy reception from all 20 huskies.

Antarctic Division photo

Vol. 9, No. 5

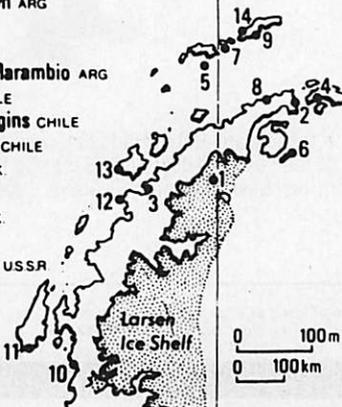
Registered at Post Office Headquarters,
Wellington, New Zealand, as a magazine.

March, 1981

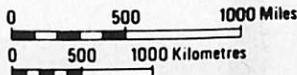


ANTARCTIC PENINSULA

- 1 Teniente Matienzo ARG
- 2 Esperanza ARG
- 3 Almirante Brown ARG
- 4 Petrel ARG
- 5 Decapcion ARG
- 6 Vicecomodoro Marambio ARG
- 7 Arturo Prat CHILE
- 8 Bernardo O'Higgins CHILE
- 9 Presidente Frei CHILE
- 10 Stonington I. UK
- 11 Adelaide I. UK
- 12 Argentine Is UK
- 13 Palmer USA
- 14 Bellingshausen USSR



ANTARCTICA



ABBREVIATIONS

- ARG ARGENTINA
- AUST AUSTRALIA
- NZ NEW ZEALAND
- SA SOUTH AFRICA
- UK UNITED KINGDOM
- USA UNITED STATES OF AMERICA
- USSR UNION OF SOVIET SOCIALIST REPUBLICS

ANTARCTIC

Vol. 9, No. 5

101st Issue

March, 1981

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ISSN 0003-5327

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N.Z. PROGRAMME

SCIENCE CRUISE IN ROSS SEA

New Zealand's Antarctic research programme for the 1980-81 season, which ended last month, called on the services of more than 160 men and women during last summer. It included a major marine geophysical programme and oceanographic survey in which seven New Zealand scientists worked in the Ross Sea from the Transglobe Expedition's support ship Benjamin Bowring. A New Zealand team also took part in an aerial reconnaissance of selected areas of Northern Victoria Land to prepare for a joint project there with United States and Australian scientists in the 1981-82 season.

Seven New Zealanders took part in an international project of vulcanological studies with United States and Japanese scientists on Mt Erebus, and New Zealand support was provided for other international projects in South Victoria Land and Adelie Land. As in past seasons New Zealand scientists took part in other national programmes and shared field work with scientists from the United States, Japan, West Germany, and Australia.

Of special importance in the Scott Base rebuilding programme was the completion of the third stage — the erection of new sleeping quarters and ablutions facilities for 42 people. The building was completed before the season ended in the third week of February, and the interior work will be done next season.

Ten men began seven months of winter isolation officially on February 16 when the last members of the summer team left Scott Base for New Zealand. The winter leader, Mr J. B. Sims, of North Auckland, who is also the base engineer, and his nine companions will have radio-telephone and telegraph links with the outside world during the winter; they will see new faces again at the end of August when the spring flights by United States Navy Hercules aircraft begin. They will share their isolation with 19 huskies.

Deputy leader at Scott Base this winter is Mr T. H. Earl, senior technical officer, of Wellington. His companions are Mr R. L. Hodgson (senior Post Office technical, Wellington), I. D. Johnstone (postmaster, Kaeo), D. J. D. McKnight (scientific officer, Wellington), J. H. J. Mackey (fitter-electrician, Blenheim), A. J. Remnant (chef, Auckland), B. G. Scott (fitter-mechanic, Dunroon), A. J. Taylor (field assistant/dog handler, Auckland), and S. J. N. Whitehead (technician, Christchurch).

VICTORIA LAND

Between 50 and 60 scientists from the United States, New Zealand, and Australia are expected to take part in a programme of geology, geophysics, and glaciology in Northern Victoria Land during the 1981-82 season. New Zealand participation in the programme has been approved in principle, and if the United States agrees 12 to 20 New Zealanders will take part.

An alternative New Zealand programme of conventional research nearer Scott Base will be proposed if the Northern Victoria Land project does not go ahead. Another New Zealand project to land a geological party near Terra Nova Bay will depend on whether United States aircraft can land in the area.

To check on possible landing sites for the United States Navy Hercules aircraft



One of the two motor toboggans and sledges of the Antarctic Division's geological mapping team is lowered from the summit of Descent Pass 366m above the Descent Glacier on the way up to the Ferrar Glacier.

Photo by R. H. Findlay

which will support the establishment of a base camp housing up to 100 scientists, support staff, and helicopter crews, a reconnaissance flight was made from McMurdo Station early in December last year. On board the aircraft were Dr E. Stump, science co-ordinator for the project, Dr R. Cooper, Geological Survey, who has made several expeditions to Northern Victoria Land, Dr I. Thomas, Physics and Engineering Laboratory, Mr R. Child, Lands and Survey Department, and Mr Roger Clark, officer-in-charge at Scott Base last summer.

A remote ice sensing project was carried out during the reconnaissance flight. Dr Thomas was on board to obtain a field reference for ice typing from satellite imagery, and Mr Child, a photogrammetric camera specialists, provided photogrammetric and mapping material for future field operations. Dr Cooper checked the suitability of possible Hercules landing sites for Iroquois helicopter operations.

Seven scientists from the Geophysics Division, New Zealand Oceanographic Institute, and Victoria University of Wellington, took part in the research cruise in the Ross Sea aboard the Benjamin Bowring, which was chartered from the Transglobe Expedition by the Department of Scientific and Industrial Research. During the 18 days of the cruise the ship worked off the coast off the coast of Marie Byrd Land past the Bay of Whales, and as far north as Cape Adare. The main purpose of the research programme was to obtain marine seismic, magnetic, gravity, and bathymetric data to elucidate the tectonic structure of the western Ross Sea.

SEA TEMPERATURES

When the Benjamin Bowring sailed from Lyttelton for McMurdo Sound on January 7 there were seven scientists on board. The New Zealanders were Drs D. Burns and K. Grange, and Messrs K. Rose and T. Dean, all Oceanographic

Institute, and Jenny Bassett, an observer for the International Survey of Antarctic Seabirds (ISAS). Two scientists from the University of Cape Town, Irish-born Dr Christopher McQuaide, and English-born Lesley Rickett, were making their second voyage to Antarctic to record sea temperatures and salinity, and the density and distribution of plankton. They travelled with the Transglobe Expedition to the Fimbul Ice Shelf early last year.

On the voyage south the oceanographers collected plankton in water samples between New Zealand and the Ross Sea. When the Benjamin Bowring berthed in Winter Quarters Bay three more scientists, Drs F. Davey and D. Bennett of the Geophysical Division, and Dr D. A. Christoffel, who had been working with the Victoria University of Wellington expedition, joined the ship.

Because of ice conditions in McMurdo Sound the Benjamin Bowring was unable to penetrate into New Harbour, but the scientists were able to take a series of seabed sample cores along a line from Cape Royds to Cape Bernacchi. Five cores were recovered from a depth of 5cm and one from 25cm.

ICE TROUBLE

While in McMurdo Sound the ship got into difficulties in the ice and had to call for assistance from the United States Coast Guard icebreaker Polar Star. Then the satellite navigation unit broke down and the ship had to remain off the ice edge until the arrival of a new part from the United States.

Finally on the morning of January 29 the Benjamin Bowring began her major survey in the Ross Sea. One purpose of the survey was to establish the relationship between East and West Antarctica, and determine climatic patterns from study of the profiles of sedimentary layers up to 3km below the sea floor.

In 1975 a sediment-filled trench about 1000m deep was discovered on the western side of Ross Island, indicating that for the last 20 million years the region has been sinking. The geophysics team aboard the Benjamin Bowring hoped that the seismic survey would indicate whether the trench marked a division between East and West Antarctica.

After the western section of the survey the Benjamin Bowring headed east to Cape Adare, and then south along the Victoria Land coast, working in the area of the Drygalski Ice Tongue early in February. She returned to McMurdo Station on February 15 and sailed for Lyttelton the next morning.

N.Z. PASSENGERS

Her scientific passengers returned by air to New Zealand, but she still had nine New Zealanders aboard on the voyage north. Four were summer staff from Scott Base, Roger Clark, officer-in-charge, Hugh Webb, his deputy, Roger Ridley, meteorological observer, and Stephen Johnson, Post Office clerk. Graham Wilson, of the University of Canterbury zoology department, who had been working at Cape Bird and Lake Fryxell in the Lower Taylor Valley, joined Jenny Bassett as an observer for ISAS.

There were three New Zealanders in the Benjamin Bowring's crew when she arrived at Lyttelton on February 27. They were James Young and Mark Williams, members of the Transglobe Expedition's volunteer crew, and John Parsloe, senior second officer of the Oceanographic Institute's research vessel Tangaroa, who served as third officer on the voyage between New Zealand and Antarctica.

MAPPING TRIP

One of the early parties in the field last season was the geological expedition led by Dr R. H. Findlay, of the Antarctic Division, which made the longest motor toboggan journey undertaken by New Zealanders during the 1980-81 summer. It was in the field for nine weeks, covered more than 250km, mapped an area of 130 square miles, and brought back 843kg of rock specimens.

With Dr Findlay were another geologist, David Crow, an Antarctic Division field leader, Gary Ball, and a field assistant, Andrew Brown. They used two motor toboggans and three Nansen sledges on their journey to the Ferrar Glacier about 70km west of Scott Base.

Between November 7 last year and January 15 the party mapped in detail the

Basement rocks (granites, gneisses, schist, and marbles) of the Ferrar Glacier region. This work was a continuation of Dr Findlay's work of the previous season in the Blue Glacier area, and completed the first leg of a re-appraisal of the geology between the Skelton Glacier and Granite Harbour.

Although United States Navy helicopters were used to gain access to three localities inaccessible to motor toboggans, the team based its work on motor-toboggan and sledge transport, travelling from Scott Base across the sea ice in McMurdo Sound to Stranded Moraines, and then by way of Blue Glacier and Descent Glacier to Ferrar Glacier.

HISTORIC ROUTE

This route followed that of Lieutenant Albert Armitage, second-in-command of Scott's 1901-04 expedition, who was the first to explore the mountains on the western side of McMurdo Sound. The party made the second crossing of Descent Pass into the Ferrar Glacier.

To make the descent from Descent Pass the party had to cross a crevasse 3m wide and lower its three heavy sledges and two motor toboggans some 300m into the basin below the pass. This took a day, and the next day the party worked its way past two ice bulges in the glacier to camp in the Ferrar Glacier.

After his return to Scott Base Dr Findlay said that Armitage and his men must have worked very hard, and certainly had a little bit of luck. The area was no place for manhauling, down or up.

During the course of its work the party made the first sledge and toboggan traverse of the eastern part of the Kukri Hills, thereby saving two helicopter moves. Christmas was spent in cloud below Mt Lister, and the party then sledged up to Windy Gully and then into the Upper Taylor Valley.

Geologically the expedition was a success. But, as seems usual, according to Dr Findlay, the work emphasised further problems for future workers.

Two of the eight New Zealanders who worked for several weeks around the

summit of Mt Erebus with United States and Japanese scientists were not directly concerned with seismic studies. They were Drs Roy Daniel (biochemist) and Hugh Morgan (microbiologist), both of Waikato University.

Their purpose was to sample the hot soils of the volcano to isolate thermophilic micro-organisms. Last year they headed a research team which extracted enzymes from micro-organisms found in hot water pools in the central North Island. These enzymes are believed to be active in high temperatures unlike those now unavailable which tend to die when subjected to high temperatures.

In December Drs Daniel and Morgan collected soil samples containing thousands of micro-organisms from selected sites around the crater rim of Mt Erebus, and recorded the temperatures of the ground from which they were taken. The samples were placed in sterile containers and later cultured in an incubator at Scott Base before being brought back to New Zealand.

Samples taken from Mt Erebus were found in soil with temperatures of up to 75deg Celsius. Preliminary results of the scientists' studies at Scott Base indicated that the micro-organisms were extremely thermophilic; they liked and needed hot spots in which to grow.

FUTURE RESEARCH

Drs Daniel and Morgan will base their future enzyme research on a comparison of the Mt Erebus micro-organisms and those extracted from the New Zealand hot pools. The Antarctic micro-organisms are being subjected to growth tests at Waikato University, and attempts are being made to develop them in different media.

If the Antarctic micro-organisms differ from the samples taken from the hot pools in the Rotorua district the Waikato research team will investigate their industrial potential. But that might take a long time, and a final analysis of the differences is expected to take about six months.

Mt Erebus was chosen for the study because the Antarctic is relatively sterile. The 3794m volcano is much higher than

other parts of Antarctica, which means there is even less likelihood of contamination by other micro-organisms.

Other New Zealand scientists and surveyors worked on Mt Erebus with the International Mt Erebus Seismic Study (IMESS) headed by a New Zealander, Dr Philip Kyle, now of Ohio State University, who began his studies of the volcano in 1971. The purpose of the study is to obtain a long-term seismic record of Mt Erebus.

Seismic audio and magnetic studies were made by a seismologist from Victoria University of Wellington, Dr Ray Dibble. Magnetic disturbances were transmitted through a wire loop installed under his supervision.

SURVEY NETWORK

Members of the United States party installed three seismometers on the volcano — two on the flanks and one at the summit. The signals from these instruments were transmitted to Scott Base and received and monitored on Japanese-financed equipment. This winter the Scott Base team will monitor and maintain the equipment as long as the power source operates.

A survey network was established around the summit by Mr Peter Otway, of the Geological Survey. This will be observed annually to determine the nature of earth deformation associated with observed variations in the level of volcanic activity.

Mapping control of the summit caldera for the production of a detailed contour map by the Lands and Survey Department was completed by a surveyor, Mr Gary Neale. Two Antarctic Division field assistants, Messrs John Prosser and Roy Parrish co-ordinated the logistics and safety aspects of the whole IMESS project.

Installation of equipment at Arrival Heights 4km from Scott Base for a long-term study of the normal and disturbed D-region of the ionosphere 50km to 90km up was completed last season by a team from the physics department of Canterbury University headed by Dr Andrew von Biel. For the last four summers Dr von Biel has visited Antarctica

to instal the equipment for his proposed 10-year experiment.

In December the final stage was completed with the assistance of Ray Borrell, Graham Lees, and John Welch. A polarimeter designed by Dr von Biel is now operational at Arrival Heights, and bounces radio waves off the ionosphere, and records the "echoes" from any particles of electrical charges present in the D-region.

Dr von Biel's equipment is designed to monitor itself so it requires only maintenance checks to continue functioning during the 10-year experiment. The purpose of the experiment is to establish the nature of the D-region, its relationship to other layers, and its influence on telecommunications. Scott Base laboratory staff will check the equipment during this winter.

Husky mascot dies

Dune, a Scott Base husky which spent two winters at McMurdo Station, first as a guest and pet, and then as the official station mascot, came back to his birth-place last year, but had to be put down towards the end of the season. He was one of four huskies born at the base between 1977 and 1978.

Three of the huskies, Noogis, Rita, and Dune, were from the same litter. Rita, who wintered at McMurdo Station with Dune in 1978, is now the station mascot at Casey, and Noogis and Vida, were sent to Mawson in exchange for two Australian-bred huskies, Dick and Klari.

Rita was given to the Australian Antarctic Division by the New Zealand Antarctic Division, and was flown to Casey on January 24, 1979. She replaced Suzie, the station mascot, who was born in 1969 and died in 1978.

Dune's death reduces the Scott Base husky population to 19. Last winter it was 21. Another dog put down last season was Hame, which would not have survived another winter.



Three members of the team from Scott Base which placed the plaque on Inexpressible Island. They are Messrs A. J. Remnant, W. McDonald, and H. J. Mackey.

Antarctic Division photo

Plaque put on Inexpressible Island

A stone cairn on Inexpressible Island in Terra Nova Bay marks the site of the snow cave in which six men of Scott's last expedition lived for more than six months of the winter of 1912. Beside the cairn is a plaque placed there on January 16 this year to indicate that the site is one of 43 historic monuments in Antarctica preserved under the terms of the Antarctic Treaty.

Since 1974 nine plaques have been placed in position at historic sites in the Ross Dependency by New Zealanders from Scott Base. Ten of the 43 approved sites and buildings are the responsibility of New Zealand as an Antarctic Treaty nation.

Inexpressible Island (74deg 54min S/163deg 43min E), which is 280km north of Scott Base by air, is out of helicopter range. Therefore the plaque to mark the snow cave site has remained

at the base for several years, awaiting an opportunity for its placement on the island.

This opportunity came on January 16 when Captain Giles Kershaw, pilot of the Transglobe Expedition's Twin Otter support aircraft, had to make a radio flight check. Assistance was offered by the expedition to enable Scott Base staff, headed by the officer-in-charge Mr Roger Clark to place the plaque in position.

Bearing inscriptions in English, Russian, French, and Spanish, the plaque which is in four sections commemorates the experiences of the Northern Party of Scott's 1910-13 expedition, which was led by Victor Campbell. In January, 1912, the six men were picked up from their winter quarters at Cape Adare by the Terra Nova.

They were deposited at Evans Coves, the seaward boundary of Inexpressible Island, to carry out a six weeks' sledging programme. But pack ice blocked the Terra Nova's attempt to collect the men before the end of February and return them to base.

Campbell and his men were left on Inexpressible Island with no hut, thin summer clothing, and skeleton rations for six men for a month. Gales ripped their tents, and they dug a cave in a large

snow drift. They lived there from March 17 to September 30, supplementing their scanty rations with seal meat and blubber, and penguin flesh.

In the spring Campbell led his party, weakened by their privations and 26 weeks in a cave where they could not stand upright, on a 320km man-hauling journey south down the coast. The six men reached the hut at Cape Evans on November 7 after 37 days of sledging.

Onyx River's flow aids raft trip

Each Antarctic summer the Onyx River, the only river on the continent entitled to the name, flows the wrong way from the coastal end of the Wright Valley into Lake Vanda — a distance of 30km. Its flow is measured each season by automatic water level recorders as part of the New Zealand monitoring programme in the dry valleys to document long and short-term climatic conditions.

Last season the Onyx, one of the few rivers in the world that flows inland, was expected to reach the Lake Vanda weir about December 7. But a cold spell slowed its progress, and it did not flow over the weir until 2.52 p.m. on December 14. In the 1979-80 season it topped the weir on December 5, and in the 1978-79 the date was December 29.

New Zealanders and other scientists who worked at Vanda Station last season had a financial interest in the flow of the Onyx. As in past seasons New Zealand hydrologists measured and recorded the flow; they and others contributed to the traditional sweepstake based on the time and date water from the river would flow over the weir.

Last season's winner was, appropriately, Trevor Chinn, leader of the Ministry of Works and Development glaciological and hydrological team which worked in the dry valleys. In the previous summer the winner was a Japanese scientist, Dr Fumiko Nishio, who was at Vanda Station to observe "ice shocks" in Lake Vanda.

By the middle of January the Onyx,

which is fed by melted water from the Lower Wright Glacier, was flowing freely, and the level of .3m to .6m enabled a New Zealander and an American to make the world's most southerly raft trip. They were Tina Troup, a field assistant with the Ministry of Works team, and Wayne Van Voorhies, one of the University of Illinois team studying the glycoprotein anti-freeze in fish living in McMurdo Sound.

Tina Troup and Wayne Van Voorhies carried a rubber raft 11.26km from Vanda Station to the snouth of Bartley Glacier. They launched their craft, and aided by a strong easterly wind were able to travel 9.6km down the river to a point above Lake Bull.

Ross Sea papers

Sixteen papers on research in the Ross Sea region since the International Geophysical Year (1957-58) which were presented at the Ross Sea symposium during the 16th meeting of the Scientific Committee on Antarctic Research in Queenstown last year will be printed as the December issue of the *Journal of the Royal Society of New Zealand*. This will be Volume 11, No. 4 of the journal.

Non-subscribers may order copies of the Ross Sea issue alone only if orders are placed with the editor, Mrs M. M. Creswell, by the end of August at the latest. Mrs Creswell's address is: Science Centre, P.O. Box 12-249, Wellington, New Zealand.

New accommodation block at Scott Base

Another stage in the programme for rebuilding Scott Base was virtually completed last summer. From late October to early February 20 men were engaged on the main construction task in the New Zealand Antarctic research programme — the erection of new sleeping quarters and ablution facilities for 42 people.

Work on the third stage was carried out by a construction team from the Antarctic Division, the Ministry of Works and Development, and four New Zealand Army storemen-packers. They were directed by an MOWD clerk of works, Mr Peter Voisin, of Auckland, and Mr Garth Varcoe, the Antarctic Division's buildings and services officer.

Although some of the building materials expected by air had to be sent by sea, and did not arrive until late in January, the new building was closed in by early February only hours before a two-day storm hit Scott Base. Men from the mechanical services division of the MOWD succeeded in installing the building's piped heating system before they and the last of the construction team left Scott Base on February 14.

Next season a construction team of 14 is expected to go south at the beginning of September to finish off the new building. Provided all goes well the sleeping quarters will be occupied before the end of the 1981-82 season. The present accommodation hut will be demolished to make way for the new mess-galley-bar block — Stage IIIB of the rebuilding programme. The block is expected to be completed in the 1982-83 season.

Snow clearance from the accommodation block site, which had been prepared in its stepped form during the two previous seasons, started late in October, and took six days. A 10-day storm made the task particularly arduous. The first of the main building party arrived early in November, and started setting out profiles in preparation for drilling holes for the foundation bolts which support the steel framework.

Drilling was held up because an American track drill was not available. A hand unit was obtained from New Zealand, and the 70 holes were drilled in three days of continuous shift work.

By early December all the main building frames were up, and the east wall and some exterior floor panels had been installed. These prefabricated panels consist of 150mm of polyurethane foamed in between two sheets of galvanised iron, which are then bolted to the building framework.

More than 45 tonnes of building materials were to have been flown south for the project, and the Army Ordnance team arrived in November to handle the cargo. However, because of weight problems, not all of the expected materials could be moved by air. The overweight units and the cargo intended for sea transport arrived aboard the United States supply ship Southern Cross in January.

Preparations for later stages in the rebuilding programme were also made last summer. The areas for the command centre site (Stage IV) and the garage (Stage VI) were filled and landscaped. Fuel tanks and the helicopter pad will be resited in the future, and last season's work included the preparation of pits to house two 15,000-gallon tanks north-east of the present helicopter pad. It is hoped to ship the tanks south next season, and instal them in 1982-83.

ICE CAVE

After many seasons the ice cave used by Scott Base as a natural deep freeze unit for meat and vegetables is now considered dangerous. Therefore it has been replaced by a 2500 cubic feet freeze unit placed directly behind the new accom-

modation block. Work on this unit took exactly six days from the time installation began until the last of a year's resupply of meat, vegetables etc, was loaded in.

To assist further scientific projects in the Miers Valley the construction team

built a 3.6m by 2.4m wannigan at the glacier end of Lake Miers. Similar to the building used by scientists at Lake Fryxell in the Taylor Valley, the wannigan is equipped with bunks, table, storage area, and minor survival gear.

New Zealand winter teams in Antarctica

Since 1957 nearly 350 men and one woman have wintered at New Zealand bases in Antarctica, and at the South Pole. Most of them have worked at Scott Base but between 1976 and 1978 five men provided meteorological services at the United States Amundsen-Scott South Pole Station.

A record compiled for the New Zealand Antarctic Society by the Antarctic Division, Department of Scientific and Industrial Research, which includes the 1981 winter team at Scott Base, shows that of the 348 winter workers 307 have lived at Scott Base. Twenty-four New Zealanders shared their winter isolation with Americans at the joint United States-New Zealand Hallett Station between 1957 and 1964, and 12 have wintered at Vanda Station in 1969, 1970, and 1974.

Most of the winter teams have been New Zealanders. They have also included Australians, Englishmen, three Americans at Scott Base in 1959, and one at Vanda Station in 1969. One Italian Navy officer, Lieutenant Franco Faggioni, spent the winter at Scott Base in 1958.

Only one New Zealand woman, the first of her sex to do so, has wintered in Antarctica. She was Mrs Thelma Rodgers, who was a scientific officer at Scott Base in 1979.

Scott Base had its largest winter population in 1957. Eighteen of them were members of the New Zealand component of the Commonwealth Trans-Antarctic Expedition led by Sir Edmund Hillary; five were members of the scientific team for the International Geophysical Year led by Dr T. Hatherton.

Since then the winter population has ranged from 14 to 10.

Since 1957 only 15 men have spent two winters at Scott Base. One man, J. E. Gawn, has wintered three times. He was one of the radio operators in 1957, and returned in 1964 and 1965.

Arrangements have been made by the New Zealand Antarctic Society for bound copies of the list of all who have wintered at New Zealand bases, and the South Pole, to be kept in the Canterbury Museum and at Scott Base as a permanent record. The list will be added to each winter in future years.

Dog dentistry

Huskies are not the easiest of dental patients. Lackey, one of the Scott Base dogs, needed oral surgery last season. He presented some problems for the United States Navy dentist, Lieutenant Taylor Miezser, and the doctor, Lieutenant Lester Reid, who came from McMurdo Station to do the dentistry.

For a start Lackey refused to be put to sleep and had to be pumped full of medication. Then the drip feed began to freeze in the chilly Scott Base hangar, and Lackey had to be carried on a large board from the hangar to the store-keeper's office where the dentistry was completed.

Lieutenant Meizer reported later that people were much easier patients, and that pacifying a husky verbally had its problems. His assistant had a nipped finger as proof.

Award of conservation trophy

A distinguished New Zealand scientist, Professor G. A. Knox, has been awarded the New Zealand Antarctic Society's Conservation Trophy for 1980. The award has been made to Professor Knox, of the zoology department, University of Canterbury, in recognition of his concern for the Antarctic environment and the conservation of its flora and fauna as director of the university's biological research programme in Antarctica since 1961. The award, announced jointly by the retiring president of the society, Mr R. M. Heke, and the retiring chairman of the Canterbury branch, Mr R. L. Park, also recognises Professor Knox's contribution to international Antarctic research as president of the Scientific Committee on Antarctica (SCAR), a co-ordinating committee of the International Council of Scientific Unions.

There have been eight previous awards of the trophy — an Emperor penguin carved in African walnut — which was presented to the Canterbury branch in 1971. The trophy is awarded to any person or organisation contributing significantly to any aspect of Antarctic conservation — preservation of flora and fauna in the Antarctic or on sub-Antarctic islands, and the preservation of historic buildings. Professor Knox was nominated by the Canterbury branch of the society, which selects the recipient.

Professor Knox is well-known for his contributions to zoological research, his sponsorship of biological research, especially in the environmental field,

and for his distinguished participation in international science. He served as chairman of SCAR's permanent working group on biology for eight years, and was secretary of SCAR for four years until his election as president in 1978.

Since Professor Knox began his Antarctic research in the 1961-62 season he has worked as a member of several organisations concerned with New Zealand's scientific interests in Antarctica and the seas surrounding the continent, and the protection of the environment. He is chairman of the New Zealand National Committee for Antarctica, and a member of the Ross Dependency Research Committee.

Huskies howl to piper's tune

Scott Base huskies do not appreciate the music of the pipes. When one of the winter team, Robin Hodgson, played "Scotland the Brave" to 20 huskies out on the sea ice below the base they responded by howling in chorus so out of tune that his playing was interrupted.

An English-born senior Post Office technician, Robin included bagpipes in his luggage when he went south last summer, hoping to relieve the monotony of an Antarctic winter. His music received a cool response when he woke the base one morning with his playing at seven o'clock. This encouraged him to seek a more appreciative audience.

Bare-kneed, and wearing a kilt in the McHardy tartan borrowed from an Ant-

arctic Division field assistant, Andrew Brown, the Scott Base piper marched confidently to the dog lines. There the huskies were delighted to see him. A break in their enthusiastic barking seemed the right moment to begin the recital. But after the opening strains Robin found once again that appreciation was sadly lacking. Instead he attracted over-enthusiastic audience participation.

Howled down by the husky chorus, Robin retreated to Scott Base to warm his very cold knees. Later he found another audience for his piping — somnolent Weddell seals basking in the summer warmth among the pressure ridges. They were lazily indifferent to the brave music.

TRANSGLOBE TEAM

Antarctica crossed in 66 days

Sixty-six days after leaving their winter base in the Borga Massif three members of the Transglobe Expedition ended their crossing of Antarctica, the longest such journey and only the second in 23 years. The leader of the expedition, Sir Ranulph Fiennes, and the other members of the ice group, Charles Burton and Oliver Shepard, entered Scott Base at 6.30 p.m. local time on January 11.

On the Antarctic section of the expedition's planned polar circumnavigation Ran Fiennes (as he prefers to be known) and his companions drove 640 c.c. snowmobiles close to 4500km across the continent. They began the main journey on October 29 last year from Ryvingen, the base near Mt Ryvingen (72deg 38min S/2deg 45min W) where they wintered for 34 weeks. With them were Lady Virginia Fiennes, known to everyone as Ginnie, and her Jack Russell terrier Bothy. Ginnie was responsible for all radio communications during the winter and the crossing.

Early in January last year a coastal base, Fimbulisen, was established on the Fimbul Ice Shelf 3.2km inland from the South African base, Sanae, in Queen Maud Land. It was manned in the winter by Simon Grimes and Anthony Birkbeck.

Although the ice group was slowed by storms and extensive sastrugi it reached the Amundsen-Scott South Pole Station on December 15, only 47 days after starting a 1448km journey along the polar meridian.

Less than 100 men of seven nations have reached the South Pole the hard way. The Transglobe party was the tenth to reach the Pole overland since 1911, and the smallest.

SUPPORT GROUPS

From the Pole Station, which it left on December 23, the ice group travelled to the head of the Robert Scott Glacier. It made the descent in three days and

reached the Ross Ice Shelf on December 29.

Sea and air support for the expedition were provided by the supply ship Benjamin Bowring, formerly the Kista Dan, and the expedition's Twin Otter aircraft, flown by the air group, Captain Giles Kershaw, and the flight engineer, Sergeant Gerry Nicholson.

In January last year the Benjamin Bowring took the expedition and its supplies and equipment to Queen Maud Land. It returned to McMurdo Sound in January this year to pick up the ice group and other members of the expedition.

Air support for the crossing was provided during the establishment of the winter base, and then from October 29 to early January this year. The Twin Otter made more than 20 supply missions from the start to the finish of the main journey.

WHITEOUT CHECK

When "Antarctic" went to press early in December last year the ice group had reached 84deg 32min S/2deg 5min E on December 5. But the brief reports of its positions did not tell the full story. Therefore this report begins on December 1.

After a run of 48km, including 12.8km of 1.8m high sastrugi, and with temperatures in the minus 20s the group reached 84deg 03min S/01deg 30min E. The next day it travelled another 40km but was stopped by a whiteout at 84deg



Journey's end: Sir Ranulph Fiennes, Charles Burton, and Oliver Shepard, with Roger Clark, officer-in-charge at Scott Base. Behind them on the leader's sledge are the flags of Britain, New Zealand, South Africa, and Oman.

26min S/01deg 30min E less than 643km from the Pole.

On December 4, having been confined to the tent for 38 hours, the group moved on to 84deg 26min S/01deg 20min E. It was only 53.7km short of 85deg S where the next resupply flight by the Twin Otter was planned originally.

Because the support aircraft needed clear, safe ice on which to land, Ran Fiennes decided that the 85deg S resupply should be made at the 84deg 26min S position. The original plan was for the Twin Otter and its crew of three to remain at 85deg S until the ice group reached the Pole.

MISSING MEN

But this plan was suspended when a call came from the South African base, Sanae, to Ryvingen, asking for the assistance of the Twin Otter in a search for three members of a field party missing on a trip back to base from Grunehogna about 133km to the south. Ran Fiennes agreed, and Giles Kershaw flew from 80deg S to Ryvingen. Because of the intense cold there — minus 40deg Celsius — the crew took 14 hours to warm up the batteries and start the engines.

By this time the three South Africans had been missing for five days. Giles Kershaw was preparing to leave when Sanae called Ryvingen to tell him to remain where he was because the snowmobile tracks of the missing party had been found.

Because of engine starting problems Giles Kershaw decided to fly south again to the Pole where the aircraft batteries could be fully charged. He took off and arrived in the early hours of December 7. The day before the ice group, its progress hindered by high sastrugi was reported to be 46.6km short of 85deg S.

ANOTHER CALL

Then one of the two South African search parties was hit by another blizzard, and a meteorologist, Mr P. G. Bell, became separated from his team, and died when he fell down a crevasse. The second search party lost the tracks of the missing men, and the South Africans radioed another call for help.

On December 8 Giles Kershaw and Gerry Nicholson took on 3636 litres of

fuel from Pole Station, and the Twin Otter left at 2.15 a.m. for the search area more than 1770km away. After landing at Ryvingen to refuel the air group began a search for the missing men.

After only 30 minutes Giles Kershaw spotted tracks in the snow. He followed them for several miles and spotted the abandoned snowmobile with the three men huddled beside it. All had frostbite after eight days of exposure, and were so weak and exhausted they could hardly stand. They had eked out their original three days' rations, and when found had only four small packets of biscuits left.

As well as flying the three men back to Sanae the group made later flights to the search area to pick up equipment and the other search party. Then Giles Kershaw and Gerry Nicholson returned to the Transglobe coastal base, Fimbulisen, for a well-earned rest.

AIR DROP

On December 9 the Twin Otter was back on the job again, and the ice group at 86deg 12min S/02deg 00min E received a welcome air drop of four bogie wheels for the snowmobiles, bread, tobacco, and one letter. The Twin Otter was overhead at 10.43 p.m. and landed at the Pole at 12.30 a.m. on December 10 to await the arrival of the ice group.

By December 11 the ice group had reached 86deg 54min S/2deg E. It was stopped by a whiteout when at 87deg 22min S/01deg 30min E, but reached 88deg S on December 13 after a day's run at 64km. Then at 89deg when only 112km from the Pole another whiteout closed in on the group, forcing it to cling to a bearing of 220deg magnetic.

After driving 98km in dense mist on December 14 the group came across three small flags in the ice at 10 p.m. These were American snow accumulation markers. Because of the hopeless visibility the three men camped to wait for better weather. In their tent they received a radio call from Giles Kershaw to advise that the Americans had picked up their location on radar.

POLE REACHED

Given a new bearing to follow the group moved off again and after about 4.8km stumbled across a United States Navy Hercules and next the expedition's

Twin Otter. Then at 4.35 a.m. on December 15 the three men arrived at the Amundsen-Scott South Pole Station 47 days after leaving Ryvingen. They were given a boisterous welcome by 60 Americans at the station, accepted a meal and the polar luxury of hot showers, but remained in their tent about 5.6m away.

FINAL STAGES

For the next week the ice group prepared for the final stages of the crossing — the descent of the Robert Scott Glacier, and the journey across the Ross Ice Shelf to Scott Base. Arrangements were made for the evacuation of the winter base, Ryvingen, and the return of Anthony Birkbeck, who had helped to man the depot at 80deg S, to Fimbulisen where he had wintered with Simon Grimes in 1980.

After Birkbeck had been flown back to Fimbulisen Giles Kershaw flew Ginnie, Simon Grimes, and Bothy to the Pole. There she and Bothy were reunited briefly with the three men they had shared eight months' isolation with at Ryvingen.

By December 23 the ice group was ready for the 340km journey to the head of the Robert Scott Glacier. The group left Pole Station at 12.40 p.m. local time, and was resupplied near the head of the glacier at 86deg 58min S/148deg 00min W.

Before the group began the descent of the glacier — the most hazardous section of the journey — Giles Kershaw and Ginnie made a reconnaissance to find what lay ahead of the 3000m descent from the Polar Plateau across 220km of snow and ice, broken by crevasses, ice bubbles, and hard blue ice domes.

TWO DESCENTS

In the last 46 years only two other parties had descended the Robert Scott Glacier. In 1934 three men of the Geological Party in Byrd's second expedition took dog teams up the glacier between November 29 and December 7. They began the descent on December 12, stopping for as much as a day to triangulate mountain peaks, and reached the Ross Ice Shelf on December 22.

Six New Zealanders who used motor toboggans made the second descent of the glacier in the summer of 1969-70.

The best speed the party made was 8km an hour. Because the glacier is so wide in places — up to 20km — the geologists took 18 hours to cross from one side to the other in the course of their investigations.

By 7.30 p.m. on December 29 the ice group had completed the descent of the glacier, and was at 85deg 30min S/151deg 51min W. The time taken — three days — was deceptive. Two weeks later Charles Burton spoke of the descent as "a nightmare I don't care to recall". Ran Fiennes compared the glacier to a minefield of crevasses, a morale-destroying place in which every step could have spelt disaster.

But by January 2 the group had left the nightmare behind, and was at 83deg 43min S/168deg 00min W, preparing for the last lap of 1500km across the ice shelf. The Twin Otter, which was not at McMurdo Station to support the group, made another flight to the Pole on January 3 and brought Ginnie, Simon Grimes and Bothy to Scott Base.

GOOD WEATHER

For the last week of the crossing the weather favoured the ice group although it was stopped for 24 hours by a whiteout. On the hard surface of the ice shelf, almost like a billiard table the snowmobiles covered greater distances each day, averaging 64km for the final stage.

On January 6 the daily run was 152km. The next day the run dropped to 127km and the group had its first halt because of a whiteout when at 80deg 51min S/175deg 38min E. Then after a run of more than 160km on January 8 the three men camped at 80deg 51min S/175deg 20min E to await the last fuel delivery by the Twin Otter.

When Giles Kershaw flew out to the party he had a passenger — Roger Clark, officer-in-charge at Scott Base. He spent 15 minutes on the ice with the three men, had a beer with them, and told them about the arrangements for their stay at Scott Base.

By January 9 the group knew Ross Island was within striking distance. When the three men camped for the night after a run of just over 160km they could see Mt Erebus rising 3794m above the Ross Ice Shelf.



Sir Ranulph Fiennes, his wife, and their Jack Russell terrier, Bothy, reunited at Scott Base.

Antarctic Division photo

Late on January 10 the men reported to Scott Base that they were less than 160km away. But there was one more problem to overcome. A piston broke on one of the snowmobiles when the group was approaching White Island about 26km from Scott Base. Repairs took three hours.

PIPER'S WELCOME

By 6 p.m. on January 11, however, the three snowmobiles could be seen moving across the ice. Roger Clark and others from the base went out by dog team to welcome the three men, who were given a well-deserved wash by the excited huskies as they stepped off their "tin dogs".

Flying the flags of Britain, New Zealand, South Africa, the United States, and Oman, the tiny caravan was escorted to the "front door" of Scott Base. Cheering and clapping from the base staff, and the music of the pipes

greeted the three men as they reached the firm ground of Ross Island. The piper was an English-born Post Office technical, Robin Hodgson, and his piping reminded everyone that Ran Fiennes had once served in the Royal Scots Greys.

Also there to welcome the first party to cross Antarctica since 1957-58 were four who had supported it all the way from Fimbulisen — Ginnie Fiennes, Giles Kershaw, Gerry Nicholson, Simon Grimes, and a small but important member of the expedition, Bothy.

There was one absentee — Anthony Birkbeck. He was at Fimbulisen waiting for David Mason, a reserve member of the ice group, to arrive at Cape Town aboard the South African research ship *Agulhas*. Their task was to sort and load equipment which had to be returned to sponsors in Britain.

With close on 4500km of ice behind them the ice group's first demands were

for a meal and showers. Then they made excited phone calls to Britain, and eventually settled down to sleep more comfortably in spare huts outside the Scott Base complex.

WAIT FOR SHIP

Because the ice group was so far ahead of schedule it had more than a week to wait for the arrival of the expedition's support ship Benjamin Bowring, from Lyttelton. She berthed in Winter Quarters Bay in the early hours of January 20, and after fuel and supplies, sailed the same day on a scientific cruise in the Ross Sea under charter to the New Zealand Department of Scientific and Industrial Research.

Before the Benjamin Bowring returned from its cruise two members of the expedition left Scott Base to fly back to England. Giles Kershaw and Gerry Nicholson, who supported the ice group for nearly three months, and flew more than 20 supply missions, flew the Twin Otter to New Zealand on January 28-29.

This was the first flight by a small aircraft from Antarctica to New Zealand. The Twin Otter took off at 9 p.m. local time from the ice runway one kilometre from Scott Base, and landed at Dunedin at 11.36 a.m. (N.Z.) on January 29.

Aided by tail winds Giles Kershaw covered 1980 nautical miles in 13hrs 36min flying time. He and Gerry Nicholson flew to Christchurch on February 1, and left for England by way of Auckland on February 2.

On February 16 the rest of the expedition sailed for Lyttelton, arriving on February 27. The Benjamin Bowring went into dry dock and sailed for Auckland on March 19. After trade exhibitions in Auckland, Sydney, Los Angeles, and Vancouver, she will take the expedition to the mouth of the Yukon River south of Point Barrow from where it will start the final stage of the polar circumnavigation of the world along the Greenwich meridian early in June.

New Zealand and Australian air lift

More than 200 tonnes of cargo and nearly 300 passengers were carried between Christchurch and McMurdo Station last season by Hercules aircraft of the Royal New Zealand Air Force and Royal Australian Air Force. Nineteen flights were made between October and December to provide logistic support for the New Zealand, the United States, and Australian research programmes in Antarctica, and share in the airlift of men and materials by United States Air Force Starlifters and United States Navy Hercules aircraft.

New Zealand's contribution to the logistic pool last season was 12 flights between November 26 and December 12, the same as in the previous season. The Hercules aircraft of No. 40 Squadron carried 137 tonnes of cargo and 136 passengers before the sea ice runway in McMurdo Sound became unusable for wheeled aircraft.

For the second time Australian Hercules aircraft operated through

Christchurch last season and contributed to the United States-New Zealand pool under a tripartite agreement to enable Australian scientists and base staff to be flown from McMurdo Station to Casey Station for summer research work. The first flight in October took RAAF crews who attended one of the snowcraft and survival courses run by the New Zealand Antarctic Division. Other passengers included a party of Australian journalists and RAAF public relations staff.

Six regular flights began on November 22 and ended on November 28. On the seven flights the RAAF C-130H Hercules aircraft carried 68 tonnes of cargo and 163 passengers.



U.S. project in Northern Victoria Land

A co-ordinated study at Siple Station by scientists of three nations of the precipitation of energetic electrons from the magnetosphere was the main project in the United States Antarctic research programme last season. Scientists from the United States, Britain, and Norway took part in the project, the largest of 86 in the programme, which called for the launching of seven rockets and 12 balloons from the station in Ellsworth Land between December and January.

Because of economic restraints Siple Station was closed for the winter after the summer scientific programme had been completed. It will be reopened next season, possibly for another two years. This winter three American stations are manned — McMurdo Station, the Amundsen-Scott South Pole Station, and Palmer Station on Anvers Island off the Antarctic Peninsula.

One of the major projects planned for next season is an investigation of the geology of Northern Victoria Land out of a helicopter-supported large camp. A reconnaissance of possible landing sites for United States Navy Hercules aircraft which will support the project, and a suitable camp site, was made last season.

Between 50 and 60 United States, New Zealand, and Australian scientists and support staff are expected to take part in the programme. They will be placed in the field by three helicopters for projects in geology, glacial geology, glaciology, and geophysics. The main camp, which will have a peak population of more than 60 will be established in the Evans Neve area, and scientific activities are expected to last from early November to mid-January.

MINERAL STUDIES

Last season's scientific activities in which about 285 scientists and representatives of 10 other countries took part, were supported by Hercules aircraft and helicopters of the Navy's VXE-6 Squadron, the United States Coast Guard icebreakers Polar Star and Glacier, and the National Science Foundation's research vessel Hero. Among the projects were evaluations of Antarc-

tica's mineral resources, including studies of the hydrocarbon potential of the continental margin in the Bellingshausen Sea, and along the Antarctic Peninsula, an investigation of mineralised areas on Anvers Island, and in the South Shetland Islands, and an assessment of potential resources of uranium and thorium in exposed rocks from the Koettlitz Glacier to the Convoy Range.

During its voyage from McMurdo Station to Palmer Station in January and early February the Glacier worked in the Bellingshausen Sea for five days to provide support for a marine geological field team from Rice University, Houston, Texas. This team surveyed the continental margin, constructed detailed maps of water depths, plotted ice fronts, and collected geological samples.

Since the 1975-76 season a team from the University of Kansas has conducted airborne resource and radioactivity surveys of mountains and exposed rocks in Victoria Land, Marie Byrd Land, the Darwin Glacier, and the Ellsworth Mountains. Last season the team, which included a West German scientist, returned to selected areas in Victoria Land.

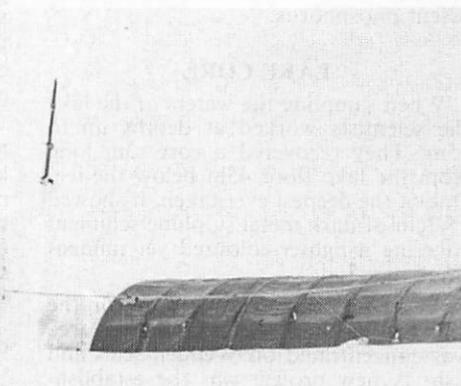
Radioactive anomalies were found on a routine reconnaissance flight, and a ground check later led to the discovery of radioactive pegmatite veins. A later survey revealed the presence of uranium near the Pyramid, north of the Koettlitz Glacier.

In the continuing search for meteorites which started in the 1976-77 season a team from the University of Pittsburgh concentrated on a large patch



An 8.8m Nike-Tomahawk rocket leaves the launching pad at Siple Station last season watched by observers on the aurora hut. Flying from the flagpole are the flags of the United States, Britain, Canada, and organisations associated with the upper atmosphere research programme.

U.S. Navy photo



of bare blue ice extending about 100km westward from Reckling Peak where 24 meteorites were collected in the 1979-80 season. The team, which included a West German scientist, found the first meteorite of the season — a nearly complete achondrite — on its motor toboggan traverse from the Allan Hills area to the blue ice field. Later in the season the team continued its search at Griffith Nunatak and on an associated blue ice field 50km to the west. Before it was flown out from Carapace Nunatak in mid-January the team reported the collection of 110 meteorites.

Unique findings were made at Lake Vanda in the Wright Valley by a team from the Virginia Polytechnic Institute and State University which spent nearly three months studying benthic algal mats and their role in the biological activities of the dry valley lakes. The team made extensive scuba diving observations in Lake Vanda, and also worked at Lakes Fryxell, Hoare, and Bonney in the lower Taylor Valley.

Towards the end of December two dive holes were drilled through 3.2m of permanent ice at Lake Vanda, and the

team made the most extensive scuba observations to date. Ice cores and grab samples were taken, and also underwater photographs.

BENTHIC MOSSES

Physical, chemical, and biological properties of the lake were discovered to be considerably different from those at Lakes Hoare and Bonney. The configuration of the algal mats was unique, and benthic mosses discovered by the divers were unlike any observed at other oasis lakes.

Early in the season the team had to melt five diving holes through 5.1m of ice at Lake Hoare. Scuba divers worked at a depth of 30m to sample benthic algal mats for immediate analysis. They also made a bathymetric map of the lake.

Limnetic surveys were made of Lakes Fryxell and Bonney. During the first such survey of Lake Bonney benthic cores were collected by scuba diving, and the first underwater photographs were taken. One result of the Lake Fryxell survey was the discovery of unusual calcium carbonate precipitates — conophytes — in the process of being deposited on the lake bottom.

Scientists from Miami University, Oxford, Ohio, also worked at Lake Vanda, sampling its waters for information about the distribution of trace metals and nutrients. They also took samples from the Onyx River which flows into the lake for analysis of phosphorus and nitrogen nutrients. One conclusion they came to was that the major metabolic limiting factor of Lake Vanda was insufficient phosphorus.

LAKE CORE

When sampling the waters of the lake the scientists worked at depths up to 65m. They recovered a core .3m long from the lake floor 45m below the ice. One of the deepest ever taken, it showed 15.2cm of dark metal sulphide sediment covering a lighter-coloured yet unidentified material.

As in the past seasons most of the research in the McMurdo Sound area was concentrated on Weddell seals and fish. A new project was the establishment of a winter camp on White Island to enable a team from the physiological research laboratory of the Scripps Institution of Oceanography to study the winter behaviour of Weddell seals.

During the establishment of the camp and the melting of a 13.7m access hole through the Ross Ice Shelf at the site surveys of seals were made from helicopters over White Island and Turtle Rock. Surveys were also made of the Scott Base pressure ridge seal community and dive recorders were placed on nine seals there to study their diving characteristics.

FISH CATCHES

Most of the fish used by a team from Hunter College, New York, which studied their metabolic adaptation to sub-zero temperatures, were caught from holes drilled in the ice of McMurdo Sound or recovered from traps placed at Cape Royds and New Harbour. Early in the season the Jamesway hut aquarium at McMurdo Station was stocked with 400 live fish of the *Trematomus* species.

Later in the season the scientists were able to fish in deeper waters from the icebreaker Glacier near Beaufort Island and in the southern Ross Sea. They also

fished from the Polar Star, and added 15 new Ross Sea species to the six species caught in McMurdo Sound.

Number of small whales in Antarctic waters and along the South American coast were the concern of a team from the Hubbs-Sea World Research Institute, San Diego, which worked aboard icebreakers and from their helicopters for a second season. In McMurdo Sound the scientists observed killer whales and minke whales, recorded their vocal sounds, and filmed and photographed the mammals.

During eight helicopter flights to the New Harbour ice edge more than 50 killer whales and 20 minke whales were observed. Numerous whale surveys and recordings were made later in the season on the ice edge and on floes in the southern Ross Sea during the Glacier's science support cruise.

When the Glacier sailed from McMurdo Station late in January one member of the team remained aboard the icebreaker to photograph and make a census of small whales on the way to Palmer Station. Detailed studies were made when science support was provided for five days in the Bellinghaasuen Sea.

POWER PLANT

Several major construction projects were carried out last season by Antarctic Services, the new civilian contractor to the National Science Foundation, which replaced Holmes and Narver on April 1 last year. They included preparation of launching and ground control systems for the rocket-balloon programme, and support for the summer camp at Siple Station. A new power plant was built at McMurdo Station, and three dormitories, each accommodating 50 people, were completed.

As the support contractor Antarctic Service, a newly-formed subsidiary of Federal Electric Corporation (a subsidiary of the International Telephone and Telegraph Corporation — ITT) operates Palmer Station, the research vessel Hero, Siple Station, and the Amundsen-Scott South Pole Station, and provides other support at McMurdo Station and elsewhere. Last season it took over the operation and

maintenance of Williams Field, the airfield for McMurdo Station, in the gradual transition of functions from the United States Navy's support force to the civilian contractor.

An airlift from McMurdo Station to Siple Station was one of the most vital tasks in support of the research programme. This was carried out by United States Navy Hercules aircraft of VXE-6 Squadron, which had to fly 2250km to Siple Station. With refuelling stops at the Byrd Station surface camp each flight took an average of five hours each way.

Between early November and late January everything needed for the rocket-balloon launching programme was transported to Siple Station by air. The aircraft also had to support the scientists and technicians who worked at the summer camp, and the preparations to close the station for the winter.

POLE FLIGHTS

VXE-6 Squadron also provided support for scientific projects in other remote areas of Antarctica. Hercules aircraft flew to Dome C in Wilkes Land, once to Vostok, and twice to Casey Station. They also put scientific parties into Northern Victoria Land and the La Gorce Mountains at the eastern side of the upper reaches of the Robert Scott Glacier in the Queen Maud Range.

A major short-haul effort was the resupply and refuelling of the Pole Station for summer operations and the winter. The squadron flew more than 200 tonnes of cargo south and close to 236,000 gallons of diesel and aviation fuel. Last supplies were flown to the station on February 11.

In support of the United States, New Zealand, and Australian summer programmes, and to maintain the American inland stations aircraft of the United States Navy and Air Force, the Royal New Zealand Air Force, and the Royal Australian Air Force carried 782 tonnes of cargo and 1635 passengers to Antarctica during the four months of the season. The United States contribution was 577 tonnes of cargo and 1326 passengers.

Tonnage by sea was more than in the

previous season. The tanker Maumee took 5.5 million gallons of aviation and diesel fuels for McMurdo Station and the United States Coast Guard icebreakers Polar Star and Glacier compared with 6.2 million in the 1979-80 season. But on her sole voyage from Lyttelton the U.S.N.S. Southern Cross, once the Mormactrade, took 5000 measurement tonnes of cargo south. She replaced the 35-year-old Private John R. Towle, which was called back from "retirement" after 20 years of Antarctic service, in the 1979-80 season.

TROUBLE AGAIN

On her second voyage to Antarctic waters the Polar Star ran into trouble again as she did in the 1978-79 season. She completed the first icebreaker resupply and refuelling of Palmer Station, and was on her way to McMurdo Station to begin cutting a channel through the sea ice in McMurdo Sound when one of the crew became ill. There was the prospect of an evacuation of the sick man by helicopter from the ship but he responded to medical treatment.

Originally the Polar Star was expected to reach the edge of the fast ice 18 nautical miles from Hut Point by January 10. But her starboard propeller became locked in reverse pitch. Her Palmer Station passengers and the sick member of the crew were transferred by helicopter to McMurdo Station, and the Glacier, which had been supporting a scientific project in the Ross Sea, returned to start cutting the channel.

By midnight on January 7 the Glacier arrived at the edge of the fast ice which was 15 nautical miles from Hut Point. She started cutting the channel, and although the ice was up to 1.2m thick in the first mile she made good progress because of a favourable wind. By January 9 she had cut a channel 180m wide, and was 10.7m from Hut Point.

When the Polar Star entered the channel cut by the Glacier she encountered first year annual ice 1.8m to 2.4m thick. But she averaged 2.2 knots through the fast ice and entered Winter Quarters Bay early on the morning of January 10. Later she continued to keep the channel clear while the Glacier returned to science support between Cape Royds

and Cape Evans, and then near Beaufort Island.

CHANNEL BLOCKED

Then the Maumea arrived. She was escorted by the Polar Star to Winter Quarters Bay where she berthed on January 22. On January 25 she departed, having been preceded by the Glacier which sailed for Palmer Station on January 23.

After escorting the Maumea out of McMurdo Sound the Polar Star started science support in the Ross Sea, but was recalled on January 26 to tend the channel which had been closed by 25 square miles of ice drifting over from the east

side. Her next task was to escort the Southern Cross into McMurdo Station.

On the way up the channel the Transglobe Expedition's support ship Benjamin Bowring, which was following the Southern Cross, became beset, and had to be freed from the ice by the Polar Star. The icebreaker's final task was to escort the Southern Cross out on February 1. After that she sailed for home, making calls at Campbell Island and Wellington.

All stations were prepared for winter by February 20. The season ended with the last flights out to Christchurch by VXE-6 Squadron Hercules aircraft on February 19.

Third woman winters at Pole

Only one of more than 75 American and New Zealand women who worked in Antarctica last summer has remained for the winter. She is Cynthia McFee, the third of her sex to winter at the Amundsen-Scott South Pole Station. Her predecessor last winter was Martha L. Kane, a cosmic ray investigator.

Miss McFee, who will share her isolation, except for radio links, with 16 men, will continue long-term measurements of trace atmospheric elements that may influence climate. During the winter she and Mr Edward Green will measure carbon dioxide, surface ozone, winds, pressure, air and snow temperature, atmospheric moisture, and other trace constituents.

This winter neither the United States nor the Soviet Union will have exchange scientists at their bases. Last year a Soviet geologist, Dr Vladimir Samsonov, wintered at McMurdo Station. His intended successor, however, failed to pass his medical tests.

A United States exchange scientist, Dr Rex Hanson, of Stanford University, spent last winter with the Soviet team at Vostok, deep in the heart of the continent. He made magnetometer studies of plasma waves as a part of the International Magnetospheric Study, and

measurements of VLF waves over the polar regions.

Dr Hanson was not replaced this winter because the IMS had been completed, and the United States programme was phased out last season. He and his equipment were brought back to McMurdo Station by the United States Navy Hercules aircraft which made the annual flight to Vostok Station on December 18.

Fewer Americans are wintering in Antarctica this year because Siple Station in Ellsworth Land has been closed until next summer. There are 91 men at McMurdo Station, 16 men and one woman at Pole Station, and six men at Palmer Station on Anvers Island off the Antarctic Peninsula.



SANAE REPORTS

New base completed last year

South Africa's new base in Queen Maud Land, erected early in 1979, and occupied for the last two winters, has now been completed. A large contingent from the Department of Public Works put the finishing touches to Sanae III during the relief of the 20th South African National Antarctic Expedition in January and February last year.

On her relief voyage from Cape Town with the new team for SANAE-21 the research and supply ship *Agulhas* encountered only minimal pack ice in the Weddell Sea. She left Cape Town on January 3 and arrived at Polarbjorn Bukta on the Fimbul Ice Shelf on January 11.

Unloading of supplies and equipment was carried out speedily across the bay ice to the base. Engaged in the same task for their base, Fimbulisen, were members of the British Transglobe Expedition, working from their support ship Benjamin Bowring. The takeover period was three weeks, and the SANAE-20 team departed on February 4.

Late in April the new team was reduced by one. The diesel mechanic, Mr B. P. Botha, who had contracted tuberculosis, was picked up on April 26 by two South African Air Force helicopters and flown 45 nautical miles from Sanae III to the *Agulhas*, which took him back to Cape Town.

In the first seven months the SANAE-21 team experienced a wide range of temperatures. The maximum, minus 0.7deg Celsius, was recorded on March 19, and on August 27 the temperature dropped to minus 47.9deg. August 16 was a stormy day with winds reaching 74 knots, and a maximum gust of 92 knots.

With the approach of spring plans were made for field trips in October and November. Both field parties were to visit the mountainous Grunehogna area about 300km inland and south of Sanae III.

A new programme for putting frequency modulated micro-pulsations on magnetic tape was instigated last year as part of the Natal University programme. VLF readings were continued, including a co-ordinated programme with the British Antarctic Survey base Halley, and the Transglobe Expedition base Ryvingen in the Borga Massif. Auroral displays did not prove very exciting during the winter months.

In the Potchefstroom University programme the two new micro-processor units set up in 1979 for the neutron monitor and the rhiometers of the cosmic radiation programme proved satisfactory for another year's work.

Rhodes University carried out work on ionospherics and star observations last year. Hermanus Observatory was engaged on magnetic field work.

Christmas trees to Vostok

New Zealand provided Christmas trees for remote stations in Antarctica last summer. Two were flown to the coldest place on earth, the Soviet Vostok Station on the Polar Plateau 1150km from McMurdo Station, and six went to Siple Station, the United States base in Ellsworth Land, which is 2250km from Ross Island.

Fifty pine trees were given to the United States naval support force by the North Canterbury Catchment Board. Six went to the Amundsen-Scott South Pole Station, two to Scott Base, several to scientific field parties, and the rest decorated buildings at McMurdo Station.

BAS NEWS

Ship damage and pack ice affect programme

Heavy pack ice in the Weddell Sea, bad weather over the Antarctic Peninsula, and damage to the propeller blades of the Royal Research Ship John Biscoe reduced the scope of the British Antarctic Survey's research programme last season. The John Biscoe had to be towed to Montevideo for dry-docking by H.M.S. Endurance, the Royal Navy's ice patrol ship, and then was forced to return to the United Kingdom under her own power after the damaged blades had been replaced by spares.

Withdrawal of the John Biscoe affected several aspects of the programme. It was not possible to proceed with the latest phases of the Offshore Biological Programme, which had suffered previously when the 1978-79 and 1979-80 seasons were curtailed because the John Biscoe was undergoing a major refit in 1979. Also BAS was unable to participate in the First International Biomass Experiment (FIBEX) scheduled for last month, and limited the amount of support that could be given to earth scientists during the summer.

Although the R.R.S. Bransfield took over a number of the John Biscoe's tasks, severe ice conditions, particularly in the Weddell Sea, increased the time needed for the relief of the 83 men who wintered at the five BAS stations last year. The Bransfield encountered heavy pack ice on her missions to Rothera, Signy, and Halley. To add to BAS problems one of the two twin Otter aircraft was delayed at Punta Arenas for six weeks, first by wheel-ski hydraulic trouble, and then by bad weather over the Antarctic Peninsula.

To give summer field workers maximum time on South Georgia and neighbouring Bird Island, and to pick up the seven men stranded at Signy Island at the end of the 1979-80 season, the John Biscoe sailed from the United Kingdom earlier than usual, leaving Southampton on September 23. Unusually extensive ice prevented access to Signy before mid-

November, and in the meantime the ship sailed for the Damoy air facility, Wiencke Island, where men and supplies are landed each year for ferrying by air to Rothera Station and southern work sites.

While the ship was crossing Drake Passage en route for Damoy, one blade sheared off her propeller, and serious cracks appeared in another. The John Biscoe returned to the Falkland Islands on November 25 and, after further inspection, arrangements were made for her to be towed 1000 miles by H.M.S. Endurance to dry-dock in Montevideo. (This was one of the longest peacetime tows undertaken by a vessel other than a tug).

BLADE CRACKS

When the ship was docked it was found that two of the three remaining propeller blades had also developed cracks, indicating metal fatigue resulting from vibration from an unknown cause which could have also damaged other machinery. It was decided that two spare blades which were on board should be fitted and the ship returned to the United Kingdom under her own power. She arrived at Southampton in the last week of February.

The Royal Research Ship Bransfield revisited South Georgia at the end of November, returned to the Falklands and then carried out a number of the John Biscoe's tasks, beginning with the

relief of Signy and the run to Damoy. The latter was given high priority so that summer field parties could be flown to their work sites as soon as possible.

Faraday (Argentine Islands) was relieved in mid-December, and the ship visited Palmer Station and then proceeded south to the old station on Adelaide Island, where stores were landed and an emergency air strip marked out. Fast ice in Marguerite Bay still prevented access to Rothera Station and the ship returned to the Falklands by way of the Argentine station Almirante Brown, the Chilean station Gonzales Videla and the Polish station Arctowski.

At the beginning of January the ship sailed once more for South Georgia — this time with a BBC film team led by David Attenborough on board. The BBC team were filming sequences for a series entitled "Planet Earth", but also took shots of the Bransfield for another programme.

HEAVY PACK

Heavy pack ice extended north of the South Orkney Islands throughout December and into January. Although the Bransfield had managed to pick up the men from Signy in early December it was not possible to get in to unload stores. Therefore the ship sailed for Halley, proceeding east to longitude 20deg W before turning south, in order to avoid the worst of the Weddell Sea ice. She arrived on January 11.

Unloading was possible within a few miles of the station, which was fortunate, as the major item to be handled was the Advanced Ionospheric Sounder (A.I.S.) weighing nine tons. Although the unloading site was carefully inspected, it was not certain that the sea ice would bear the weight, but all went well and the equipment was towed up the ice ramp to the ice shelf and on to the station without much difficulty.

Dr Michael Rycroft, head of the BAS atmospheric sciences division, and the chief ionosphericist, Dr John Dudeney, were on the Bransfield and, together with two other ionosphericists from headquarters who had flown in by way of Rothera, supervised installation of the A.I.S.

General unloading was interrupted by severe weather, during which much of the fast ice broke back, and the shore lead closed up for a while. The Bransfield then spent six days establishing a depot for future field work on the Weddell Province Project (a project to examine the boundary and relationships between the areas of either side of the Weddell Sea and Ronne and Filchner Ice Shelves).

OPEN WATER

At that time open water extended south-west beyond Druzhnaya, and the BAS depot was established on the Ronne Ice Front, west of Berkner Island, although ice had prevented three West German charter vessels from reaching the area less than two weeks previously. (The West Germans had been forced to turn north and eventually set up their station at Atka Bay west of Sanae).

When the Bransfield returned to Halley she was weather-bound again, which gave the ionosphericists a few more days to work on the A.I.S. She sailed finally on February 2, leaving 15 winterers at the station. Two days later she arrived back at Grytviken, South Georgia, and proceeded to St Andrews Bay where a small hut was put up for use by biologists in future seasons. (This brings the number of field huts on South Georgia to 13. The ship landed botanists in several localities and then called at Bird Island before once more setting course for Signy.

Signy was reached on February 9 and the relief completed in four days. A field hut was then landed and erected at Stygian Cove in the north of the island, and after rendezvousing with the R.R.S. Shackleton and the West German research ship Meteor the Bransfield proceeded to Montevideo. She arrived there on February 18, and picked up the ship's co-master, Captain John Cole, more summer visitors (headquarters' staff) and stores.

Apart from towing the John Biscoe, H.M.S. Endurance again given valuable assistance in transporting a number of BAS and non-BAS parties — including glaciologists from the Scott Polar Research Institute, Cambridge, who are monitoring the tilt and strain of the

iceberg, and the B.B.C. team who were taken to Signy. The *Endurance's* helicopters also carried out aerial photography at South Georgia and elsewhere for BAS biologists.

AIR OPERATIONS

One of the two BAS Twin Otter aircraft arrived at Rothera, Adelaide Island, from Canada on November 23, having dropped mail at Faraday en route. The other was unfortunately delayed at Punta Arenas for six weeks, first with wheel-ski hydraulic trouble, and then by bad weather over the Antarctic Peninsula.

Two days after arriving at Rothera, it ferried the two ionosphericists to Halley to prepare for the arrival of the A.I.S. Radio echo sounding equipment was then installed in the aircraft for flights in the vicinity of the Ellsworth Mountains.

Meanwhile, when the weather permitted, the first aircraft managed to establish field parties at several localities — geologists in the Eternity Range and on the Detroit Plateau, and glaciologists at the northern end of George VI Sound, on the east coast of the Peninsula and at its southern end.

Geologists who had sledged to the Arrowsmith Peninsula, northeast of Marguerite Bay, in December, completed work in the area and were then flown to join the party on the east coast. Unfortunately because of the late arrival of the second aircraft, geological work on James Ross Island had to be postponed.

WEATHER REPORTS

During air operations south of Rothera a succession of two-man parties occupied the Fossil Bluff hut to provide weather reports. Emergency overland routes back to Rothera were also reconnoitred from the air and supplied with depots.

But the bad weather persisted. In the three weeks between mid-January and the beginning of February only two flights were possible.

Among the short journeys made from Halley in December was a reconnaissance for a new station site. Halley is on

the Brunt Ice Shelf and is moving westwards at about .8km a year — fortunately parallel to the nearest ice edge which is only 2.4km away.

The station was last rebuilt in the 1972-73 summer and is still in good condition (the steel tubes in which the buildings were constructed having protected them from distortion although they are permanently buried), but because of the lateral movement the station will have to be rebuilt again in 1982-83. (Part of the pre-1967 complex has now floated out to sea in icebergs).

BIG BERG

A watch has been kept on an iceberg measuring about 16km by 4km, which appears to have broken off from the Stancomb-Wills Glacier Tongue and has been drifting southeastwards. It could create serious problems if it grounded near Halley or collided with the ice front which already shows incipient cracks.

Scientific programmes at all stations are progressing, and the A.I.S. at Halley is functioning satisfactorily.

At Grytviken, South Georgia, the Royal Engineers who are rebuilding the BAS jetty have made good progress, and at Signy work on the new two-storey building (store and cold rooms) is also well-advanced.

At Faraday, the new living quarters are fully operational. Improvements to the old building are nearing completion.

SHIP VISITS

The former BAS ship *Shackleton* has been working again in the Scotia Sea ("Antarctic", December, 1980) and spent Christmas at Grytviken. Her additional men helped provide a good congregation for the carol service, which has held in the old Norwegian whalers' church.

Other visitors to Grytviken included the tourist ships *Lindblad Explorer* and *World Discoverer*, the *Bashkirya*, the West German research ship *Meteor* and the French yacht *Shieldaig*. Two West German terrestrial biologists worked with BAS on South Georgia, and a party of Russians visited Halley on their way to *Druzhnaya*. A Brazilian observer,

Lieutenant E. N. Santanna, spent some time on the Bransfield.

Four women were also welcomed at BAS stations this season. One was a member of the Scott Polar Research Institute iceberg party, and another the wife of Captain Stuart Lawrence, master

of the Bransfield, who accompanied her husband to Grytviken, Signy, Faraday and Adelaide Island. The other two, including photographer Cindy Buxton, spent some time in South Georgia filming wildlife.

West German base put on Ekstrom Ice Shelf

West Germany's first permanent research station in Antarctica was established last summer, but not on the Filchner-Ronne Ice Shelf west of Berkner Island as originally planned. Heavy pack ice in the Weddell Sea extending north of the South Orkney Islands in December and January forced the West German expedition to set up the station on the Ekstrom Ice Shelf off the Princess Martha Coast at 70deg 37min S/8deg 22min W, west of the South African base Sanae III on the Fimbul Ice Shelf.

Construction of the station was completed on February 24, and it was officially opened on February 28. By March 2 the three ships which took part in the operation — Polarsirkel, Gotland II, and Titan — were on their way home.

West Germany's first station has been named George von Neumayer. The name commemorates the work of Drevon Neumayer, director of the Marine Observatory at Hamburg, who played a leading part in the revival of Antarctic exploration at the turn of last century.

In the 1979-80 season the reconnaissance expedition aboard the chartered Norwegian research vessel Polarsirkel encountered good ice and weather conditions in the Weddell Sea, and the ship was able to penetrate further west than any other ship had done before. Visits were made to the British Antarctic Survey station, Halley, the two Argentine stations, Belgrano I and II, and the Soviet summer station, Druzhnaya, on the Filchner Ice Shelf.

Two suitable sites for the new station were found, one on the Ekstrom Ice Shelf, and the other on the Filchner-Ronne Ice Shelf at 77deg 09min S/50deg 38min W. When the expedition returned to Bremerhaven the Filchner Ice Shelf

site was described as ideal, meeting all major requirements. Access through the pack ice was fairly readily available, and the edge of the ice shelf was only five to 10 metres high, enabling equipment and stores to be landed without difficulty for transport to the base site 20km inland.

A contract for building the new station was awarded to a Hamburg construction firm, Christiani and Nielsen, at the beginning of last year. The co-ordinators of the project were the Alfred Wegener Polar Research Institute, Bremerhaven, and Dorsch Consult, a Munich firm of engineering consultants which designed the station.

Three chartered ships sailed for the Weddell Sea in November last year with

materials for the station, a construction team of 40, and 12 scientists aboard. They were headed by the Norwegian polar research vessel *Polarsirkel*.

On the way south marine biologists aboard the *Polarsirkel* studied the distribution of krill and ichthyoplankton in the Scotia and Weddell Seas, made seal surveys in the Weddell Sea, and pollution studies of seals. The original science programme provided for glaciological, meteorological, and geophysical studies on the Filchner-Ronne Ice Shelf, and snow engineering experiments.

Early in January, however, the heavy ice prevented the ships from reaching the Gould Bay area of the Filchner-Ronne Ice Shelf. They were forced to turn north and eventually were reported to have entered Atka Bay to establish the new station on the Ekstrom Ice Shelf.

Atka Bay appears on most Antarctic maps as Atka Iceport, named after the United States icebreaker *Atka*, which visited the area in the 1954-55 season. Atka Iceport (70deg 35min S/7deg 50min W) is about 24km wide across its entrance, and extends southward into the ice shelf about 16km. In 1955 the shelf was about 4.5m to 12m high, rising slowly to about 45m when 9.6km from the sea.

SMALL ICEPORT

There is another small iceport about 48km east of Atka Iceport at 70deg 21.5min S.6deg 11min W. In 1955 it was reported to provide excellent shelter for ships which could moor alongside the bay ice.

To the east of the site of West Germany's new station is an area of Queen Maud Land which has historical associations with German Antarctic research. It is New Schwabenland between 12deg 00min W and 16deg 00min E. It was the area named by the 1938-39 German Antarctic Expedition led by Captain Alfred Ritscher in the 8000-tonne catapult ship *Schwabenland*.

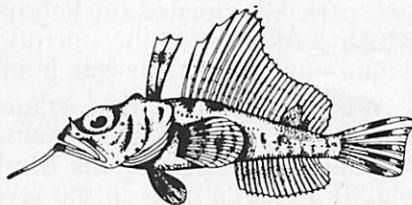
This expedition, using two Lufthansa Dornier flying-boats surveyed by air and mapped photogrammetrically the Princess Martha and Princess Astrid Coasts between 12deg W and 20deg E

from the shoreline across the coastal foreland up on to the Polar Plateau. One flight reached 75deg 25min S/0deg 20min W. Three landings were made before the *Schwabenland* left the area early in February, 1939.

Survival courses

Nearly 350 men and women took part in courses in basic snowcraft and survival conducted by three New Zealand mountaineers from Scott Base last season. The field leader, Carl Thompson, and his field assistants, John Prosser and Peter Sommerville, ran courses for the Antarctic Division from October 15 to the end of January.

Last season's courses included American and New Zealand research and support staff, United States air crews, and the crews of Royal New Zealand Air Force and Royal Australian Air Force aircraft, crews of the United States Coast Guard icebreakers and members of the British Transglobe Expedition.



No thicker ice

How thick is the thickest ice on earth, and where is it? The answers to these questions have been submitted for inclusion in the "Guinness Book of Records" by the Polar Information Service, Division of Polar Programmes, United States National Science Foundation.

Antarctica has the thickest ice on earth in Wilkes Land at 69deg 9min S/130deg 5.2min E. It is 4776m or 2.9 miles from top to bottom, and was measured in the 1970s during a radio-echo sounding survey in East Antarctica by scientists from the United States Antarctic research programme, the Scott Polar Research Institute, and the Technical University of Denmark.

SAE-26

New winter station on ice shelf

Glaciological studies in East Antarctica, marine geological investigations in the Weddell Sea, and the establishment of another winter station Druzhnaya II, on the Filchner Ice Shelf, were among projects in the research programme of the 26th Soviet Antarctic Expedition last season. In addition the new air route between Moscow and Molodezhnaya, inaugurated in February last year, was used to fly 50 scientists and support staff to Antarctica.

SAE-26 began operations in October last year when the first ships, headed by the Kapitan Markov, began the relief and resupply of the six coastal stations — Molodezhnaya, Mirny, Novolazarevskaya, Bellingshausen, Leningradskaya, and Russkaya. Druzhnaya I was reopened for the summer, and Vostok was supplied by tractor train from Mirny later in the season.

Last season's expedition was led by a 50-year-old geographer, Dr Vladimir Shamontyev, who has wintered on Soviet Arctic drifting ice stations in past seasons. Six hundred scientists and support staff went south last summer, half to relieve the winter teams, and half to work through the 1980-81 summer. Eight ships took part in the programme, including the hydro-meteorological research vessels, Professor Vize, on her tenth Antarctic voyage, and the Priliv.

An Aeroflot Ilyushin-18D aircraft made the first regular flight to Molodezhnaya. It flew by way of Odessa, Aden and Maputo, Mozambique, and landed on the new compressed snow runway 26km east of the station.

One of the major projects in the programme started last season was to drill through the ice-cap near Komsomolskaya, the seasonal station on the Polar Plateau between Mirny and Vostok. Komsomolskaya, which has an auxiliary airstrip, is 3048m above sea level and 850km inland from Mirny.

Drilling into the ice-cap, which is about 3050m thick, will continue for two more seasons. The hole, cut with an elec-

tric thermal drill, is expected to reach a depth of about 4828m, and the ice cores obtained will provide evidence of climatic changes thousands of years ago.

In East Antarctica a glaciological team made another traverse from Mirny by way of Pioneerskaya to Dome C in Wilkes Land. An Australian glaciologist, Mr J. Walsh, was on the traverse which was part of the International Antarctic Glaciological Project.

Work in the Weddell Sea area included seismic probes into sedimentary deposits on the seabed to study Antarctica's underwater bonding with South America. In the 1979-80 season geologists of SAE-25 who worked from Druzhnaya I discovered a fracture extending 272km beneath the Weddell Sea and under the ice-cap.

Druzhnaya II was established on the Filchner Ice Shelf about 643km west of Druzhnaya I. Preparations for construction of the new base began in the 1978-79 season when a prefabricated panel building was erected on the site.

POLE FLIGHT

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. An Ilyushin-14 was used for magnetic survey flights over coastal and inland areas.

On February 9 the Ilyushin-14 landed at the Amundsen-Scott South Pole Sta-

tion in the course of its survey flight. The aircraft arrived only 15 minutes before two United States Navy Hercules aircraft which made the final flights from McMurdo Station before the summer season ended. On board the Ilyushin-14 was Dr E. Kamenev, summer leader at Druzhnaya I, who was formerly an exchange scientist with the United States research programme in the 1972-73 season.

Nine men, headed by Vladimir Stepanov, an upper atmosphere specialist, were the first to winter at Russkaya, the new coastal station at Cape Burks (74deg 42min S/136deg 51min W) in West Antarctica, which was formally established on March 10 last year. Their work included ionosphere studies, and the measurement of industrial wastes in the snow caused by atmospheric pollution. The projects were continued last summer.

Two hydro-meteorological research ships, the Professor Vize and the Priliv, took part in the international Polex-South programme in the Southern Ocean last season. The 5497-tonne Professor Vize, worked south of New Zealand and Tasmania between 140deg and 160deg E.

SEVERAL TRIPS

Between late November and early March the Professor Vize, commanded by Captain J. Kovalov, made several trips out of New Zealand ports to enable her 53 scientists to study ocean currents, temperatures, sea water chemistry, and atmospheric conditions. She called at Wellington early in December, at Lyttelton on January 27, and at Dunedin on March 6. From Dunedin she sailed south to land and pick up staff at Soviet stations.

A newcomer to New Zealand and southern waters was the 3283-tonne Priliv, which called at Lyttelton on January 26 to take on fuel and provisions, and sailed for Antarctica on January 29. Built in Poland 11 years ago, the Priliv is registered in Vladivostok, and is fully equipped for hydro-meteorological work.

Seasonal summer work in the 1979-80 season included four traverses Mirny to

Dome B, Dome C, and the South Geomagnetic Pole. Radio-echo sounding on the Dome B traverse identified a subglacial body of water at a depth of 3560m. Scientists from Druzhnaya I worked in the Pensacola Mountains, and the supply ship Gizhiga placed three radio transmitters on icebergs for a joint Soviet-French programme of iceberg studies on her way from Russkaya to Leningradskaya.

When the Gizhiga departed from Antarctic waters in May last year the 1979-80 Soviet resupply season ended. After having established Russkaya in early March the Gizhiga resupplied Leningradskaya on the Oates Coast.

LATE DEPARTURE

One hundred shuttle trips by the Gizhiga's two Mi-8 helicopters over a two-week period were needed in the Leningradskaya operation. The Gizhiga had to anchor at the fast ice edge about 15 nautical miles from the station.

Of the five other ships which participated in SAE-25 the last to return home were the passenger ship Estoniya, and the Professor Vize. The Estoniya, which had delivered the 1980 winter teams under N. Tyabin, picked up the 1979 winter teams under A. Artem'yev, and the 1979-80 summer staff, returning to the Soviet Union in April after a 93-day absence. On her ninth Antarctic voyage the Professor Vize carried out oceanographic surveys west of Maud Rise, and along Latitude 20deg E between Antarctica and Africa.

JARE—23 leaders

Leaders of the 23rd Japanese Antarctic Research Expedition (JARE-23) for 1981-83 have been selected. They are Professor Takao Hoshiai, marine biologist in the National Institute of Polar Research, and a glaciologist, Dr Shinji Mae.

Professor Hoshiai will be the leader of JARE-23 and winter at Syowa Station. Dr Mae will be his deputy, and will lead the summer party.

Survey of minke whale population

Ten scientists representing six of the International Whaling Commission member countries took part in a minke whale assessment cruise in the Southern Ocean last summer. The two-month cruise in the area between 170deg W and 130deg E south of Australia and New Zealand and north of the Ross Sea was the third since 1978-79, and part of the International Whaling Commission/International Decade of Cetacean Research programme.

Financial and other support for the programme was provided by the governments of four IWC member nations, and three whale catchers were made available for the sighting and marking census — two by Japan and one by the Soviet Union. This was the first cruise in which the Soviet Union had participated.

Concerted exploitation of minke whales, particularly by Japanese and Soviet whaling fleets began in the 1971-72 season. The minke whale represents the last major baleen whale resource of the Southern Ocean, and management of the species on an adequate scientific basis has become vitally necessary.

Because of the variability in estimates of minke whale population the IWC scientific committee recommended that there should be a properly organised and scientifically supervised census based on sighting and marking techniques, independent of commercial whaling. The first assessment cruise was made in the 1978-79 summer and covered Area IV (70deg E to 130deg E).

Last summer's cruise began on December 17 when three whale catchers, the *Vdumchiyi 34*, *Toshi Maru II*, and *Kyo Maru 27*, sailed from Wellington. They returned to port in the middle of last month.

SURVEY TEAM

Leader of the cruise was Dr P. B. Best, of the South African Sea Fisheries Branch, Cape Town, who is director of the Marine Mammals Research Centre. Other participants were: United States, Messrs L. Tsunoda, National Marine Fisheries Service, Seattle, G. Joyce, and

R. Rollett; Japan, Dr H. Kato, Hokkaido University, Dr N. Miyazaki, and Mr F. Kasamatsu; Australia, Mr D. Hembree, West Australian Museum; New Zealand, Mr Paul Ensor. A Soviet scientist also took part in the survey.

For the first cruise two scouting vessels, former Japanese whale catchers, were used, and six scientists from South Africa, the United States, Australia, and Japan took part under the leadership of Dr Best. Two of the scientists worked from a Japanese factory ship to determine the efficiency of recovery of marks. Japanese and Soviet whaling in Area IV was limited during the period when marking was in progress.

During the cruise the scientists sighted 1087 minke whales and marked 725. They also sighted 47 sperm whales, 27 humpbacks, and three other species — two fin, two blue, and two sei. Of the 5517 whales seen 5322 were minke, and 136 sperm.

A detailed analysis of the results of the cruise was presented to the annual meeting of the IWC in 1979. It included estimates of the size of the minke population in Area IV based on sightings and mark recaptures. A second cruise was undertaken during the summer of 1979-80 in Area III (0deg to 70deg E).

QUOTA FIXED

Japan's 35th Antarctic whaling expedition sailed south in October last year. It consisted of one factory ship and four catchers. Its quota of minke whales for the season was fixed at 3120 at the IWC annual meeting last year.

During the season which ran for more than three months to the middle of this month the Japanese expected to obtain 12,792 tons of frozen whale meat and 1716 tons of whale oil. The operations

were supervised and observed by two inspectors from the Japanese National Fisheries Agency. Also on board the factory ship were two IWC observers.

Relics of Ross Sea party

Two relics of probably the most tragic and least known episodes in Antarctica history have been presented to the Canterbury Museum. They are a prismatic compass and a sealing knife used by Mr R. W. Richards, now sole survivor of the 10 men in the Ross Sea party of Shackleton's Imperial Trans-Antarctic Expedition (1914-17) who were marooned on Ross Island for 20 months without fresh stores, fuel or changes of clothing.

Mr Richards, who is 87, lives at Point Lonsdale, near Melbourne. When he and six survivors of the party were rescued early in January, 1917, he was asked by Shackleton if he wanted a souvenir. He selected the compass. Shackleton, using a diamond in his signet ring, scratched these words, still visible on the back of the compass: "To R. W. Richards from E. H. Shackleton, January, 1917."

When Shackleton planned his Imperial Trans-Antarctic Expedition his purpose was to cross the continent from the Ross Sea to the Ross Sea. The task of the Ross Sea Party was to proceed in the Aurora to McMurdo Sound, and then lay food and fuel depots every 96km as far south as Mt Hope at the foot of the Beardmore Glacier (83deg 37min S).

On the night of May 6-7, 1915, the Aurora, which was being prepared for wintering in McMurdo Sound, was blown out to sea, trapped in the pack ice, and then drifted north for nearly a year. She finally reached Port Chalmers on April 3, 1916.

Back at Cape Evans "Dick" Richards and his companions were cut off from the world, and knew nothing of the fate of the Aurora or Shackleton's ship, the Endurance, which had been caught in the ice of the Weddell Sea. But they laid the depots, man-hauling heavily-laden

sledges on three southern journeys in appalling snow and ice conditions.

DIFFICULT DAYS

"Dick" Richards used his compass to take bearings of cairns erected during the depot laying. In a letter to Mr D. L. Harrowfield, the Canterbury Museum's Antarctic curator, he says that the compass which he kept for more than 65 years, has emotional associations for him. The lives of the depot laying party on the third journey very definitely depended on the compass during six difficult days in 1916.

To lay the depots cost the lives of three men. One of them, an Englishman, was the Rev. Arnold Patrick Spencer-Smith, who was an assistant curate at All Saints' Church, Edinburgh when appointed by Shackleton as padre and photographer with the Ross Sea Party. He was ordained soon after his appointment.

Spencer-Smith was one of nine men who left Hut Point on December 13, 1915, to make the third and greatest of the sledge journeys to lay the final depots as far as Mt Hope. When the party reached 80deg S three men were instructed to return to Hut Point. One was Spencer-Smith's cousin, Irvine Owen Gaze, who died in 1978.

Six men continued south and laid the first two depots, but only 48km from Mt Hope Spencer-Smith collapsed with scurvy. He insisted that the others should press on, and remained alone in a tent on the Ross Ice Shelf.

DESPERATE MARCH

After 148 days of sledging from Hut Point the five men reached Mt Hope and laid the last depot. Then they began a desperate march back to Hut Point 595km away. Six days later they picked up Spencer-Smith and struggled on.

On March, 9, 1916, Spencer-Smith died only eight days before his 33rd birthday, having been dragged some 48km on the sledge by his friends for more than 40 days. The party was then 32km short of Hutt Point and safety. A large snow cairn was built to mark the grave, and a cross was placed on it 10 months later.

Spencer-Smith's diary for 1915 was brought back to New Zealand where it has been held privately for many years. Now it has been acquired by the Canterbury Museum, and has been placed in the National Antarctic Centre with other relics of the Ross Sea Party.

MEMORIAL SERVICE

Gaze brought back from Scott's hut at Cape Evans the silver Communion vessels and a pair of brass candlesticks used by his cousin to celebrate services there. The Communion vessels have been presented to the museum by a relative of Gaze in New Zealand, and the candlesticks, which were passed on later to "Dick" Richards, were presented by him last year.

To commemorate the 65th anniversary of the death of Spencer-Smith, who was the first clergyman to go to Antarctica, and the only one to have died there, a special service was held on March 8 at St Mary's Church, Addington, Christchurch. The Communion vessels and the candlesticks were used in the service, which was conducted by Archdeacon Michael Brown, chaplain to the Antarctic Division, D.S.I.R., and the Rev. Lester Kyle, vicar of St Mary's.

Selected readings at the service were taken from original papers associated

with the Ross Sea Party. After the service the Communion vessels, and three stoles which belonged to Spencer-Smith, were formally handed over to the museum.

SCOTT EXPEDITION

Relics of Scott's first expedition (1901-04) and Byrd's second expedition (1933-35) have also been acquired by the Canterbury Museum in recent months. One is a framed photograph of C. Reginald Ford, who was the last of the Discovery men when he died in Auckland at the age of 92 in 1972.

Ford, a young writer in the Royal Navy, was only 20 when he was engaged as ship's steward of the Discovery. With C. H. Hare, assistant steward for the first year, he was the youngest member of the expedition. Officially he was the ship's steward, but his role in the Discovery was more that of stores officer and secretary.

On the silver frame of the photograph are engraved the initials "L. O.". The photograph and a dinner plate from the Discovery were gifts to Miss Lily Oram who, it is understood, Ford was courting at the time the ship was in Lyttelton. They have been given to the museum by Mrs L. Oram, of Christchurch, sister-in-law of the original recipient.

An album of photographs which belonged to Bernard W. Skinner, a tractor driver with Byrd's second expedition, has been given to the museum by Mr D. R. Wynn, of Christchurch. Skinner was originally a United States Army Air Corps parachutist, who hoped to jump in Antarctica.

BYRD AIRCRAFT

Skinner wintered at Little America in 1934, but had no opportunity to make any parachute jumps then or during the summer. As a tractor driver he took part in the attempts to rescue Byrd from Bolling Advance Base on the Ross Ice Shelf when he became ill from carbon monoxide poisoning. He remained in Christchurch after the expedition returned to New Zealand, and was drowned many years ago in a boating accident on one of the southern lakes.

Some of the photographs in the album reflect Skinner's interest in aviation. They show the tri-motor Ford monoplane Floyd Bennett in which Byrd made the first flight to the South Pole in 1929 during his first expedition, the Curtiss Condor and Pilgrim monoplanes used by the second expedition, and the remains of its Kellett auto-gyro, forerunner of today's helicopters, which crashed on an ascent from Little America.

Other photographs show the expedition's ships, Bear of Oakland and Jacob

Ruppert in the Bay of Whales, penguins at Little America, and icebergs in the Ross Sea at 73deg S. Among photographs of tractors is one of a Citroen drawing a sledge loaded with the first mail to leave Little America.

A relic of Shackleton's last visit to Christchurch in 1917 has disappeared from the grounds of a hostel now used by the Christchurch Polytechnic. Shackleton planted an oak tree in the hostel grounds. The tree is still there; the plaque and marble slab beneath it have been stolen.

Cruise ships in Ross Dependency

Two cruise ships, the World Discoverer and the Lindblad Explorer, each made one cruise to the Ross Dependency, sub-Antarctic islands, and then to New Zealand last season. The World Discoverer, which entered the cruise business in the 1977-78 season, visited McMurdo Station for the first time last month on the last of four cruises, the first three being to the Antarctic Peninsula area.

A 3153-tonne West German ship owned by Reederei de Vries and Co., Hamburg, the World Discoverer was chartered for the cruise to the Ross Dependency by Society Expeditions, of Seattle. She carried 110 passengers, 65 from the United States, 25 from West Germany, and the remainder from Canada, Australia, Brazil, Switzerland, Israel, Austria, France, the Argentine, and the United Kingdom.

On January 22 the World Discoverer sailed from Punta Arenas, Chile and arrived at Puerto Williams in the Beagle Channel on January 25. Her first Antarctic call was to the Polish Arc-towski Station in Admiralty Bay, King George Island, in the South Shetlands.

From King George Island the World Discoverer sailed to Paradise Harbour on the Antarctic Peninsula where passengers were able to visit the Argentine station, Almirante Brown, on January 29. After a call at Port Lockroy, Wiencke Island, the ship arrived at the United States Palmer Sta-

tion on Anvers Island in the evening of January 29. It sailed for the Ross Sea the next day.

On her way to McMurdo Station the World Discoverer had some trouble in the ice, and had to continue her voyage under reduced power to conserve fuel. In the first week of February the channel into McMurdo Sound was blocked, and the ship was not expected to reach Cape Royds and Cape Evans. But on February 10, the day before her arrival, the ice moved out as far as Cape Armitage, and she reached Winter Quarters Bay at 7.30 p.m. on February 11.

HUT VISIT

Passengers and many of the crew were given a tour of McMurdo Station on the morning of February 12, and about 40 visited Scott Base. The ship left for Cape Evans and Cape Royds shortly after noon, but passengers could not land at Cape Evans to visit Scott's hut because of ice and a heavy swell.

But Roger Clark, the officer-in-charge at Scott Base, and his deputy, Hugh Webb, who were invited aboard the ship, guided more than 100 passengers and crew through Shackleton's hut at Cape Royds. They also gave a lecture on the New Zealand research programme and screened colour slides before the ship sailed in the early evening of February 12.

No call was made at Cape Adare because of ice conditions, and the need

to conserve fuel, but the World Discoverer called at Macquarie Island on February 18, and the Auckland Islands on February 20. She arrived at Lyttelton on the morning of February 22, and after disembarking most of her Antarctic tourists, sailed in the evening with 100 more on a cruise to South Pacific Islands and Papua New Guinea.

LONG CRUISE

On her first cruise in southern waters the Lindblad Explorer sailed from Singapore later in November on an 11,000 mile sub-Antarctic cruise. She called at the French Iles Kerguelen, and Ile de la Possession in the Crozet Archipelago, the Australian Heard and McDonald Islands, the Norwegian Bouvet Island, and ended the cruise at Ushuaia Tierra del Guego.

From Ushuaia the Lindblad Explorer sailed in the middle of January to the Falkland Islands (Islas Malvinas). The she visited Polish, Chilean, and Argentinian base in the Antarctic Peninsula area. Her last call before sailing for the Ross Sea was at Palmer Station. She arrived at McMurdo Station on February 18, and on her way north to Lyttelton called at Macquarie Island, the Auckland Islands, and Bluff. After her arrival at Lyttelton on March 6 she went into dry dock.

While the ship was at McMurdo Station her passengers were able to visit the historic huts at Hut Point, Cape Evans, and Cape Royds. A Force 9 gale prevented a landing at Cape Adare on the voyage north to inspect Borchgrevink's hut, and the remains of the hut erected by Scott's Northern Party.

SUB-ANTARCTIC

New weather equipment on Marion Island

Satellite transmission of meteorological data from Marion Island to South Africa has been made possible by the installation of a data collection platform at the base last year. The meteorological team also has a computerised balloon tracking system which became operational towards the end of the year.

In mid-May the 37th team under the leadership of Erich Goldschagg arrived aboard the research and supply ship *Agulhas* from Cape Town to relieve the 14 members of the 36th team led by Philip Visser. During the takeover period which lasted a month, a new crane was erected.

Initially the meteorological team led by Riaan Lourens had difficulty with the computerised balloon tracking system. But the arrival of the necessary equipment aboard the *Agulhas* when she made her mid-year visit in September enabled the system to be made operational.

Seven additional team members arrived aboard the *Agulhas*, and two biologists, Peter Haxen and Thys Steyn, departed for Cape Town. Some of the

new arrivals were soon busily engaged in the biological research programme during the early stages of the breeding season of island wildlife.

Two scientists from the Mammal Research Institute, University of Pretoria, Charlie Panagis and Graham Kerly were engaged on seal studies. Charlie Panagis worked on the influence of elephant seals on the island's ecology, and Graham Kerly studied the relationship between two species of fur seals.

Penguins and seabirds were included in the programme carried out by Aldo Berutti, of the Percy Fitzpatrick Institute of Ornithology, University of Cape Town. His studies covered the breeding ecology of the salvions prion, the blue and white-chinned petrels, and

the monitoring of wandering albatross, King penguin and Macaroni penguin populations.

Another biologist, Shaun Russel, from the Institute of Environmental Studies, University of Orange Free State, concentrated on one aspect of the island's plant life. He investigated the annual productivity of mosses and liverworts.

BLEAK WINTER

Gough Island's 25th relief team (1979-80) arrived aboard the Agulhas in October, 1979. After occasional idyllic hot days from December to February it settled down to endure a cold and bleak winter in which most days were marked by rain and wind.

There were also light snowfalls at the base, and frequent heavy falls in the Highlands during the worst of the winter. From South Peak the mountains could be seen hidden under a thick blanket of snow.

A feature of the scientific programme last year was the operation of the DCP satellite communications system, and a computerised upper air programme. Both were the first of their kind to be introduced successfully to any remote South African weather station.

Service on Gough Island is a lonely assignment because the only ships that visit the island are the Tristan Development Company's fishing boats Hilary and Tristania II which mainly catch crayfish in the summer season. But there was an unexpected additional visitor before the onset of winter.

FRENCH YACHT

A French climbing expedition to South Georgia called in March on its way home in its yacht Basile, which had visited Grytviken and Husvik in mid-January. The crew of seven enjoyed four days of South African hospitality, and left the island with the taste of excellent Cape wines lingering on their palates.

Visits by the Hilary in February and Tristania II in June were welcome because they brought mail from home, books, and biltong. Base staff were invited to visit the Hilary, but the hooking of a 3m mako shark dampened the skin-

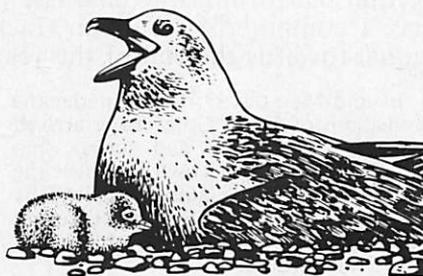
divers' enthusiasm for several weeks after the boat's departure.

Fishing, skindiving, and photography were popular hobbies which helped to relieve the monotony. There were also ample opportunities to study the island's abundant bird life, ranging from the tiny Gough bunting to the majestic wandering albatross, and also the comical Rockhopper penguins and the inquisitive but aggressive fur seals.

Mid-Winter's Day

Old Antarcticans and members of organisations with an interest in Antarctica will mark Mid-Winter's Day with a combined function in Christchurch on Saturday, June 20. The function will be held at the Brevet Club, Harewood, from 6.30 p.m. to 1 a.m. Single tickets, which cost \$16.50, have been allocated to all associated bodies. If more are required they can be obtained through the Antarctic Division, DSIR, by ringing 791-540.

A Southland/Otago mid-winter dinner will also be held on June 20. Those who want to attend should get in touch with Murray Ellis, 25 Hart Street, Dunedin.



“Antarctic” index

An index to Volume 8 of “Antarctic”, which covers the years 1977 to 1979, is now in preparation. Subscribers will be advised of its completion, and the cost, in the June issue. Copies will be obtainable from the treasurer of the New Zealand Antarctic Society, P.O. Box 1223, Christchurch.

ANTARCTIC

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

Yearly subscription NZ\$7.00, Overseas NZ\$8.00, includes postage (air mail postage extra), single copies \$2.00. Details of back issues available, may be obtained from the Secretary, New Zealand Antarctic Society (Inc.), P.O. Box 1223, Christchurch, New Zealand. Back issues more than five years old are available on request.

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

NEW ZEALAND ANTARCTIC SOCIETY (INC.)

The New Zealand Antarctic Society was formed in 1933. It comprises New Zealanders and overseas friends, many of whom have seen Antarctica for themselves, and all of whom are vitally interested in some phase of Antarctic exploration, development, or research.

You are invited to become a member, South Island residents should write to the Canterbury secretary, North Islanders should write to the Wellington secretary, and overseas residents to the secretary of the New Zealand Society. For addresses, see below. The yearly membership fee is NZ\$5.00 (or equivalent local currency). Membership fee, overseas and local, including "Antarctic", NZ\$11.00.

New Zealand Secretary: P.O. Box 1223, Christchurch

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

MEMBERSHIP

The New Zealand Antarctic Society (NZAS) is a non-profit organization dedicated to the promotion of research, education, and public awareness of the Antarctic region. The Society was founded in 1956 and has since then been a leading force in the field of Antarctic studies in New Zealand. The Society's activities include the organization of expeditions, the publication of journals and books, and the holding of lectures and seminars. The Society also maintains a museum and a library of books and documents related to the Antarctic. The Society's membership is open to all who are interested in the Antarctic and who wish to support its activities. The Society's membership is divided into several categories, including ordinary, life, and corporate membership. The Society's membership is currently over 1000 members.

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