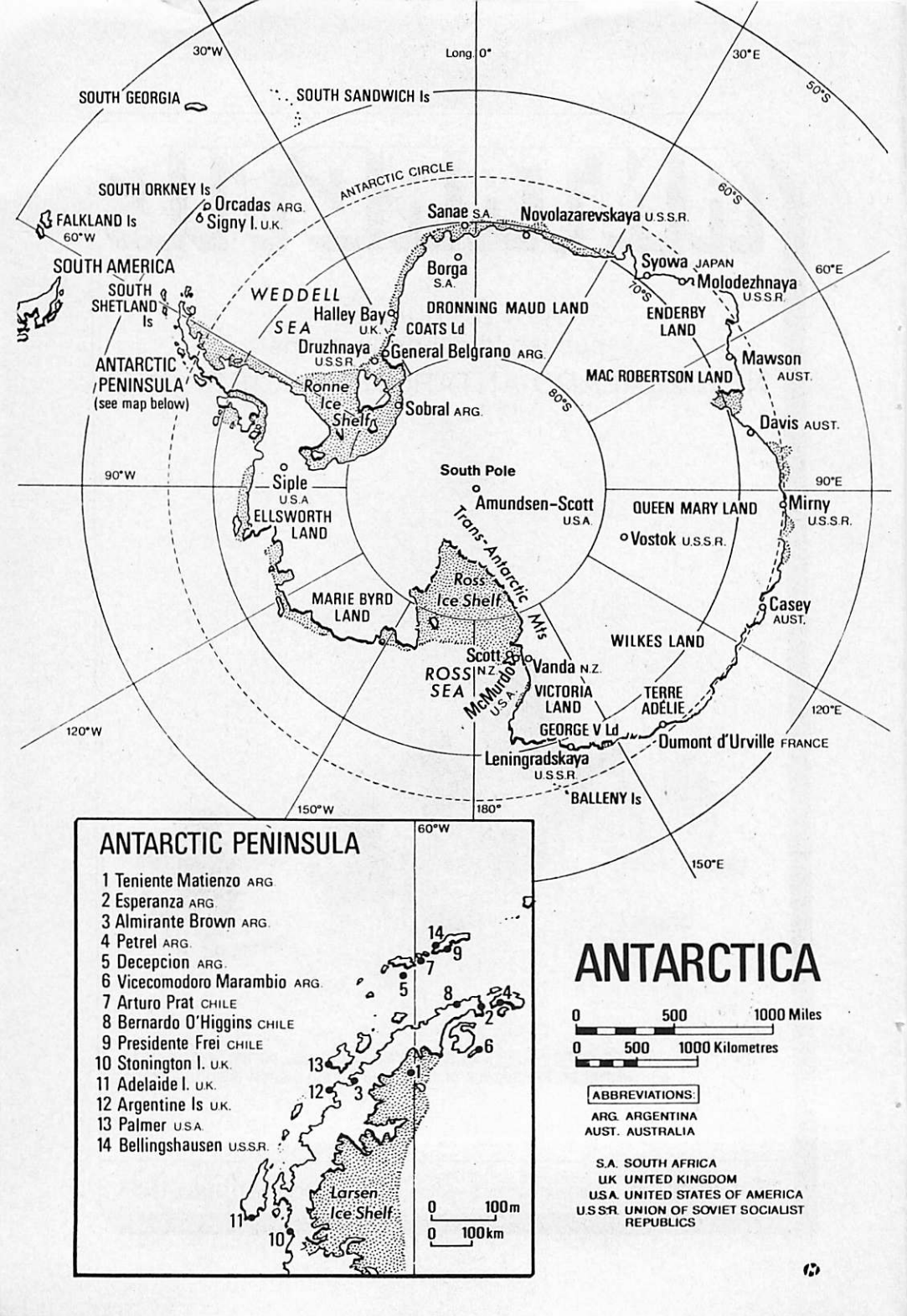
ANTARCTIC

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

Nine noses pointing home. A team of New Zealand huskies on the way back to Scott Base after a run on the sea ice of McMurdo Sound. Black Island is in the background.

Photo by Colin Monteath

Vol. 9, No. 8 Registered at Post Office Headquarters, Wellington, New Zealand, as a magazine. **December, 1981**



ANTARCTIC PENINSULA

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ANTARCTICA

0 500 1000 Miles
0 500 1000 Kilometres

ABBREVIATIONS:

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

ANTARCTIC

(successor to 'Antarctic News Bulletin')

Vol. 9, No. 8. 104th Issue. December, 1981

Editor: J. M. CAFFIN, 35 Chepstow Avenue, Christchurch, 5.
Address all contributions, inquiries etc. to the Editor.

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ISSN 0003-5327

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NEW ZEALAND FIELD WORK BEGINS

New Zealand's Antarctic research programme for 1981-82, which began officially on October 5, was not materially affected by bad weather and severe solar flares which caused a communications black-out and delayed flights from Christchurch to McMurdo Station in the first weeks of the season. By the middle of this month field parties were at work in the mountains of Northern Victoria Land 600km north of Scott Base, on Mt Erebus, in the dry valleys of Victoria Land, at Cape Bird, and around McMurdo Sound.

Early this month the Royal New Zealand Air Force completed 10 flights from Christchurch using Hercules wheeled aircraft to provide logistic support for the New Zealand and United States programmes. This was the 17th season that the RNZAF had carried passengers and cargo between New Zealand and Antarctica. The Royal Australian Air Force also made four Hercules flights between Christchurch and McMurdo Station this month as its contribution to the logistic pool, and one training flight late last month.

New Zealand's summer programme began as soon as three New Zealanders on the first flights of the season by United States Air Force Starlifters reached Scott Base. They were Mr N. C. McPherson, executive officer, Antarctic Division, Mr A. E. Newton, officer-in-charge for the summer, and Mr Martin Taylor, who flew south to conduct psychological tests of the 1981 winter team.

On the clear and sunny afternoon of October 10 and in a temperature of minus 15.6deg Celsius the 10 men who spent last winter at Scott Base completed their Antarctic service. The leader, Mr John Sims, hauled down his New Zealand flag, which had flown at the base since February 16, and handed over to Tony Newton.

In the evening the winter team said goodbye to their leader and presented him with a painting of Scott Base and Mt Erebus seen from the pressure ridges. The painting by Maurice Conly had been carried south for the occasion by Mr McPherson.

RETURN DELAYED

Although eight members of the team expected to return to New Zealand on October 12 they had to wait until October 16 because of the delay to aircraft flights caused by the communications black-out, and did not reach Christchurch until the early morning of October 17. The last of the winter men to leave Scott base were the senior technical officer, Stan Whitfield, who returned at the end of October to prepare for a year in the sub-Antarctic at the weather station on Campbell, and the dog handler, Allan Taylor, who passed on his charges to his successor, Gary Bowcock.

By the beginning of the third week in October the summer support staff had settled in and was busy preparing for the dispatch of field parties and engaged in its duties at Scott Base. The first event of the new season was a reconnaissance of a route for two fuel train journeys 120km across the sea ice of McMurdo Sound to Marble Point.

During the last two weeks of October two combined United States and New

Dr Chris Adams (left), of the Institute of Nuclear Sciences, and Dr John Bradshaw (right), of the University of Canterbury geology department, tighten the harness ropes of their Nansen sledge before their departure flight from Scott Base to Northern Victoria Land on November 7. They are members of one of five New Zealand geological expeditions which will work in the area this season.

Antarctic Division Photo

Zealand tractor trains carried diesel fuel across the sea ice for Vanda Station, fuel for United States Navy helicopter operations, and equipment for the establishment of a small scientific camp in New Harbour at the mouth of the Taylor Valley. On both journeys the New Zealand teams made ice thickness measurements at various points along the western side of McMurdo Sound to just north of Marble Point.

Led by Garth Varcoe, the Antarctic Division's buldings and services officer, the first reconnaissance from Scott Base was made on October 11 in one tracked vehicle. Also in the team were Gary Bowcock, and Tony Rossiter, one of the Ministry of Works and Development construction team engaged in the rebuilding of Scott Base.

As in recent seasons there was a large tide crack in the area of the Strand Moraines which forced the party to deviate from its planned route, and return to Scott Base. The round trip took the three men 13 hours.

SECOND PARTY

On October 14 a second reconnaissance party left Scott Base in two tracked vehicles. Plans were to reach Marble Point, and also to give new arrivals experience in sea ice travel. One of the Army construction team, Bob Dunnachie, replaced Tony Rossiter, and the party was accompanied as far as Cape Bernacchi by the snowcraft and survival team, Jon Prosser, Lindsay Main, and Nick Cradock.

Ice measurements were taken on the journey, and on the first night the party camped at the Butter Point survival hut. It had to be righted before it could be occupied, having been blown over on its side during the winter.

An early start was made on October 15, but after patches of broken ice on the early stages of the journey there was

evidence of rougher ice to come, particularly outside New Harbour. There was much upthrust ice at Cape Bernacchi, but the snow cover was reasonably good. Access to the northern ice thickness station from Marble Point on was limited, however, because of large stands of upthrust ice.

When the beach area below the Marble Point airstrip was reached, the leading vehicle was driven ashore through rough ice. As the snow cover in the area was relatively heavy the vehicle was driven over the top of Marble Point Peninsula, saving several kilometres of return journey. Eventually the lead vehicle joined the second which had developed suspension problems.

ICE THICKNESS

At this point on the evening of October 15 the party decided to return to Scott Base. Test bores were taken of the ice which ranged from .76m to 1.5m in thickness, and the 120km route was flagged at intervals of 1.2km. In the early hours of the morning of October 16 a weary team arrived back at base.

Before the main fuel train of two New Zealand and five United States tracked vehicles departed on October 21 the route established by the ice party was checked by helicopter on October 19. It was confirmed as the best possible.

After final checks the fuel train moved out from the sea ice in front of McMurdo Station at 8 a.m. and headed across the sound. It was led by a Scott Base D4C bulldozer driven by Garth Varcoe. The D4C towed a large sledge with nearly 9000 litres of drummed diesel fuel, and a smaller vehicle carried the four members of the party and towed a ski-equipped trailer with tents, food, and clothing.

In the American contingent were two D6 bulldozers which towed sledges loaded with 45,425 litres of helicopter fuel. The other three vehicles were a D4, an escort vehicle, and a large ice auger rig to drill diving holes in the ice for the scientists working at New Harbour.

ROUGH ICE

Four New Zealanders took part in the sea ice journey. With Garth Varcoe were Peter Breen, one of the summer support staff at Scott Base, Gary Neale, a Lands and Surveyor Department surveyor working with the programme this season, and Keith Wayman, of the New Zealand Fire Service, who had completed a fire safety inspection of Scott Base.

Once under way the faster auger rig moved on, and the 22-year-old New Zealand D4C was soon passed by the more powerful D6s. After crossing the Strand Moraines the United States party eventually delivered the scientific equipment for the New Harbour camp at 10 p.m. and remained for the night. The New Zealanders kept going.

This time the going around Cape Bernacchi was extremely rough as the snow had been blown off the broken ice, and winching was needed. Eventually the area below the Marble Point airstrip was reached, and the D4C was driven across the rough shoreline ice. Then the heavily-laden sledge was towed across. But the smaller vehicle could not hurdle the ice so the D4C dropped the load and towed it across.

There were only a few kilometres to go to reach the airstrip but the distance took more than an hour. First the D4C did not have the power or weight in the deep snow to tow up the steep hillside, and therefore the driver had to run ahead and winch for the whole of the land journey.

DIFFICULT DRIVING

Sixteen hours after leaving McMurdo Station the New Zealanders finally reached the old airstrip at 12.30 a.m. on October 22. The fuel was unloaded, and after a few hours' sleep the party began the return journey to Scott Base at 11 a.m.

Just off Cape Bernacchi a spring broke on the escort vehicle. A snow bank was formed by the D4C and the vehicle was loaded on the empty sledge. A few kilometres further on the United States party was sighted again still on its way to Marble Point.

For the last 30km of the return

journey Garth Varcoe and Peter Breen, who shared the D4C driving, encountered very bad light and virtual white-out conditions. But the party finally reached Scott Base at 3 a.m. on October 23. The Americans returned to McMurdo Station without difficulty early on the evening of October 24.

A second combined fuel train took more fuel to Marble Point in the last week of October. The New Zealanders carried 8601 litres of fuel for Vanda Station, which had been opened for the season on October 26, and for a science project on the sea ice in McMurdo Sound.

In the party were Gary Bowcock, Peter Nelson, the winter team's mechanic, and Michael Dimond, one of the Army construction team. They carried out ice thickness measurements during their journey, and also relocated the survival hut at Butter Point.

DOG TRANSFER

Before the arrival of the summer contingent the winter dog handler, Allan Taylor, made his last journey with nine of his charges. In September he and the leader, John Sims, made a trip over the sea ice to Cape Evans and Cape Royds where the two men inspected the historic huts.

A three-day trip over the sea ice to the Daily Islands and then towards the entrance to the Koettlitz Glacier completed the transfer of the 22 huskies at Scott Base in the last week of October. Three men, Colin Monteath, field officer, Antarctic Division, Gary Bowcock and Allan Taylor, took 13 dogs on their trip.

Left behind with their nine elders were two pups born in September and only six weeks old. Two other pups did not survive the winter; they froze to death on September 5 when the temperature dropped to minus 51deg Celsius.

On the run to the Dailey Islands where they camped on the first night the three men experienced very cold temperatures ranging from minus 26deg to minus 37deg Celsius. After leaving the camp they travelled on a line running towards Mt Discovery until they approached the entrance to the Koettlitz Glacier about opposite the Miers and Marshall Glaciers. Then they returned along their outward route to camp again on the "Dirty Ice" before coming back to base.

SHELF MOVEMENT

Among the early teams in the field during the first month were the two Lands and Survey Department surveyors, Gary Neale and Pat Tinnelly. One of their first tasks was to monitor the McMurdo Ice Shelf movement study. They found that the rate of movement of the shelf was now up to 100m a year.

Training of United States and New Zealand staff in snowcraft and survival began soon after Jon Prosser (field leader), and his field assistants, Lindsay Main and Nick Cradock, had tested their search and rescue eqipment. Among those attending the courses last month were RNZAF and RAAF air crews who took part in the New Zealand and Australia logistic flights between November 17 and early December.

MAJOR SURVEY

New Zealand's contribtion of 16 scientists and support staff to the major geological study of Northern Victoria Land began early last month when the first of five geological field parties left Scott Base and flew to the base camp on the Evans Neve. This party was headed by Dr Malcolm Laird, of the Geological Survey, and included Dr John Bradshaw, head of the geology department, University of Canterbury, Dr Chris Adams, Institute of Nuclear Sciences, and Ken Sullivan, field leader.

Dr Laird and his party are studying the Bowers Supergroup sequence in which are found marine fossils of the type called Archaeocyatha. These same fossils were discovered in the Beardmore Glacier area by Scott's last expedition, and are also known to occur in Australia.

This expedition is investigating the relationship and possible connection between the rock formations of Antarctica and Australia. The purpose is to obtain more evidence to support the theory of drift and the existence of the ancient southern supercontinent of Gondwanaland.

By the end of last month the five New Zealand field parties, supported by three United States Navy helicopters from the base camp, were engaged in extensive studies in the Bowers and Admiralty Mountains, travelling by motor toboggan to different areas from their field camps. One party included United States and Australian scientists.

WORK ON EREBUS

Six New Zealanders were at work this month around the summit area of Mt Erebus with United States and Japanese scientists in the International Mt Erebus Seismic Study (IMESS). They are Peter Otway (Geological Survey), Dr Ray Dibble (Victoria University of Wellington), Dr Keith Thompson and Neville Rogers (Waikato University), Pat Tinnelly (Lands and Survey) and Nick Cradock (field assistant).

Seismic activity on Erebus is the concern of Peter Otway and Dr Dibble. Earth deformation associated with variations in the level of volcanic activitiy is being surveyed for the second time by Peter Otway. Dr Dibble, who is a seismologist, is continuing the seismic audio and magnetic studies he made on Erebus last season, and checking seismic recording stations established on the volcano.

In the 1977-78 season Dr Thompson and Neville Rogers began botanical research at the summit area. This season they are studying mosses, algae, and fungi which live in the fumaroles and warm soil of Erebus.

Vanda Station, which provides base support for parties working in the 'dry valleys of Victoria Land, is now playing host to guest scientists from the People's Republic of China and Japan. The Chinese, Dr Sheng-Yuang Wang, a 44 year-old geochemist, and Mr Dezan Ye, a 31-year-old microbiologist, are the first scientists from their country to work with the New Zealand programme.

For the 15th season a Japanese scientific team is carrying out geological and geochemical studies in the dry valleys. The team is led by Dr Tetsuya Torii, and the others are Dr Yuki Yusa, Dr Genki Matsumoto, and Mr Haruta Murayama.

Back at Scott Base New Zealand Army and Ministry of Works and Development construction teams, some of whom have been there since late August, have almost completed the interior finishing of the new accommodation and ablutions block, which will have space for 42 people. It is expected to be ready for occupation by the end of this month.

Work is also in progress on the next phase of the rebuilding programme — the construction of the new kitchen and mess block. Foundations have been prepared, and the building is planned to be finished to the shell stage when the season ends in February.

Sun power for radios

Wind, sunshine, and nuclear fuel, have all been used in Antarctica to provide heating, lighting, and communications at bases. Now the Antarctic Division, Department of Scientific and Industrial Research, is studying the feasability of using solar cell panels to provide power for radio sets at remote field stations.

Three American-made panels are under test this summer. One panel, which cost $470 has been installed at Vanda Station in the Wright Valley, and provides power for the station and scientific equipment. A larger panel, which has an output of 72 watts, and cost $5000, has been placed at Crater Hill about 1km from Scott Base to power a very high frequency repeater station.

Early next year a smaller panel, which cost $225, will be taken to Cape Adare. It will provide power for the radio which will link a New Zealand party working there with Scott Base 725km to the south.

If the panels are as successful as the Antarctic Division hopes they will be, they will save man hours, flying time, and money. Once teams are equipped with solar cells United States Navy aircraft and helicopters will not have to fly to remote field stations to replace flat batteriees in radio sets.

25 years of N.Z. research in Antarctica

New Zealand will celebrate 25 years of scientific research in Antarctica next year. Scott Base, its first and principal station, was established on Ross Island on January 20, 1957. Since then its name has become synonymous with New Zealand's internationally-recognised contribution to Antarctic research and exploration.

A simple flag-raising ceremony will mark the anniversary of the dedication of the base a quarter of a century ago. In 1957 the youngest member of the first expedition, Able Seaman Ramon Tito, of H.M.N.Z.S. Endeavour, raised the New Zealand flag. Next year's ceremony will be held at the same time, 3 p.m., and the youngest New Zealander at the base will perform the same duty.

Nine official guests have been invited to attend the ceremony. They are the Prime Minister (Mr R. D. Muldoon), the Leader of the Opposition (Mr W. E. Rowling), Mr B. C. Beetham, M.P., Leader of the Social Credit Party, the Minister of Science and Technology (Dr I. J. Shearer), Sir Edmund Hillary, Sir Holmes Miller, Dr E. I. Robertson, Wing Commander W. J. Cranfield, and Mr H. H. Ayres. Mr R. B. Thomson, superintendent, Antarctic Division, Department of Scientific and Industrial Research, will be host to the official party during its stay in Antarctica, which will probably include visits to New Zealand's mainland station, Vanda, in the Wright Valley, and to scientific field parties.

When Scott Base was established at Pram Point, Ross Island, it had a double role initially. It was a scientific station to support New Zealand's contribution to the International Geophysical Year (1957-58), and a staging point for the New Zealand section of the Commonwealth Trans-Antarctic Expedition (TAE). Five members of the official party contributed to the dual purpose of the base, and four helped to build it.

Sir Edmund Hillary was leader of the New Zealand section of TAE, and the first leader at Scott Base. His deputy, Sir Holmes Miller, will be at Scott Base on January 20 as chairman of the Ross Dependency Research Committee which is responsible for the co-ordination of New Zealand's research programmes in the Ross Dependency.

Dr E. I. Robertson, who retired last year as Director-General of the DSIR, played a leading part in the preparations for New Zealand's first summer of science in Antarctica 25 years ago, and its contribution to the IGY which was carried out by five scientists led by Dr T. Hatherton, now director, Geophysics Division, DSIR. He was chairman of the New Zealand IGY Committee, and a member of the Ross Sea Committee which was responsible for planning New Zealand's part in the TAE, and establishing Scott Base.

One of the 23 men who were the first to winter at Scott Base was New Zealand's noted guide and mountaineer, Mr Ayres. He was the first man to be named for the New Zealand party, and was selected as dog expert and mountaineer. In the 1955-56 summer he accompanied the Australian National Antarctic Research Expedition to Mawson, and obtained 21 adult dogs and five pups for the use of the New Zealanders.

Wing Commander Cranfield was a 22-year-old flying officer when he was chosen as second pilot for the Royal New Zealand Air Force Antarctic Flight. He and the chief pilot, Squadron Leader J. R. Claydon, flew the expedition's two

aircraft to support the scientific field parties, Hillary's journey to the South Pole, and the crossing of Antarctica by the team led by Sir Vivian Fuchs.

There have been many changes at Scott Base since the hectic days of January 25 years ago when New Zealanders — and Americans from nearby McMurdo Station — worked together during the 24 hours of Antarctic summer daylight to erect the original huts. A complete rebuilding programme was started in the 1976—77 season to provide accommodation for larger scientific and support teams, and to enable New Zealand to maintain its greatly expanded scientific programmes.

By 1985 Scott Base will be an entirely new station. On January 20 the Prime Minister will open two of the new buildings. One is the completed accommodation and ablution block for 42 people; the other is a mess hall, kitchen, and lounge block, which will have reached the shell stage next month.

To commemorate the anniversary, and the completion of 25 years of scientific research an enlarged framed photograph of the first ceremony on January 20, 1957, will be presented to Scott Base. On behalf of the New Zealand Antarctic Society, of which he is a past president, Sir Holmes Miller will present a bound copy of a list of the 347 men and one woman who have wintered at New Zealand bases in Antarctica, and at the South Pole. Of these 307, including the 1981 winter team, have lived at Scott Base.

A first day commemorative cover has been produced by the Antarctic Division for the historic occasion. It has been designed by the division's official artist, Mr R. M. Conly. A pictorial date stamp has also been prepared by the Post Office for use on the covers.

Coincidentally, the New Zealand Post Office will issue a new definitive set of stamps for the Ross Dependency on January 20. The stamps, which replace the existing set issued in 1972, have been designed by Mr Conly. They show Scott's hut at Cape Evans, tracked snow vehicles, Scott Base, Adelie penguins, Vanda Station, and a field party.

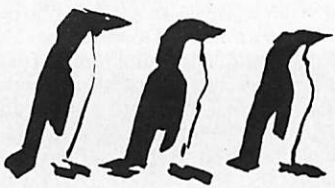
Most southerly voters

New Zealand's most southerly voters in last month's General Election were the men and women at Scott Base and Vanda Station, in the dry valleys, and in Northern Victoria Land. Probably the first New Zealanders to vote outside their country were five who left Scott Base on November 7 to work with the international geological expedition in Northern Victoria Land.

Because of the distance from Scott Base to the base camp on the Evans Neve — about 600km — it was not possible for voting to be carried out at remote field camps in Northern Victoria Land. Arrangements were made for the 16 New Zealand scientists and field assistants working there to cast special votes at Scott Base.

Special voting papers had been delivered earlier by air from Christchurch. After nominations closed in New Zealand on November 6 Scott Base was notified of the candidate's names by telex. Special voting papers were also flown by helicopter to Vanda Station in the Wright Valley where New Zealanders working in the dry valleys were able to vote.

Before the day of the election, November 28, the officer-in-charge at Scott Base, Tony Newton, who was the returning officer, made a special trip by helicopter to collect the voting papers from Vanda Station. Most of the electors in the Ross Dependency, including New Zealanders working at McMurdo Station with the United State programme voted at the Scott Base polling booth.



Aerial census of Ross Dependency Adelie penguins

As part of New Zealand's contribution to the International Survey of Antarctic Seabirds (ISAS) two scientists made an aerial photographic survey and census of penguin colonies in the Ross Dependency early this month. Mr R. H. Taylor and Dr P. R. Wilson, Ecology Division, Department of Scientific and Industrial Research, Nelson, surveyed about 1600km of coastline in the Ross Sea from Ross Island to Cape Adare during a flight between Christchurch and McMurdo Station on December 6 by a Royal Australian Air Force Hercules.

ISAS is designed to monitor in the 1981-82 and 1982-83 seasons the status of krill stocks, and to improve knowledge of birds and penguins in the Antarctic and sub-Antarctic. Penguins — Adelies around the Antarctic coast and the Macaroni (or Royal) on the sub-Antarctic islands — have been chosen as the principal species to be studied in the main ISAS field seasons of 1981-82 and 1982-83 as their diet is made up mostly of krill.

If krill stocks in the Southern Ocean increase, then the numbers of penguins should increase for their main food supply will be abundant. A fall in krill numbers will produce a decrease in the number of penguins because there is less food. Therefore close monitoring of penguin populations will allow the status of krill stocks to be monitored — the primary aim of ISAS at this time.

Priority has been given to three regions during the two seasons: (1) Scotia Sea-Antarctic Peninsula; (2) Enderby and MacRobertson Lands; (3) Ross Sea.

In a paper this year on the distribution and numbers of penguins in the Ross Dependency, Rowley Taylor, who began his penguin studies at Cape Royds in the 1959-60 season, estimated that in all known areas between 160deg E and 150deg W there were 790,650 breeding pairs of Adelies, and 50,000 breeding pairs of Emperors.

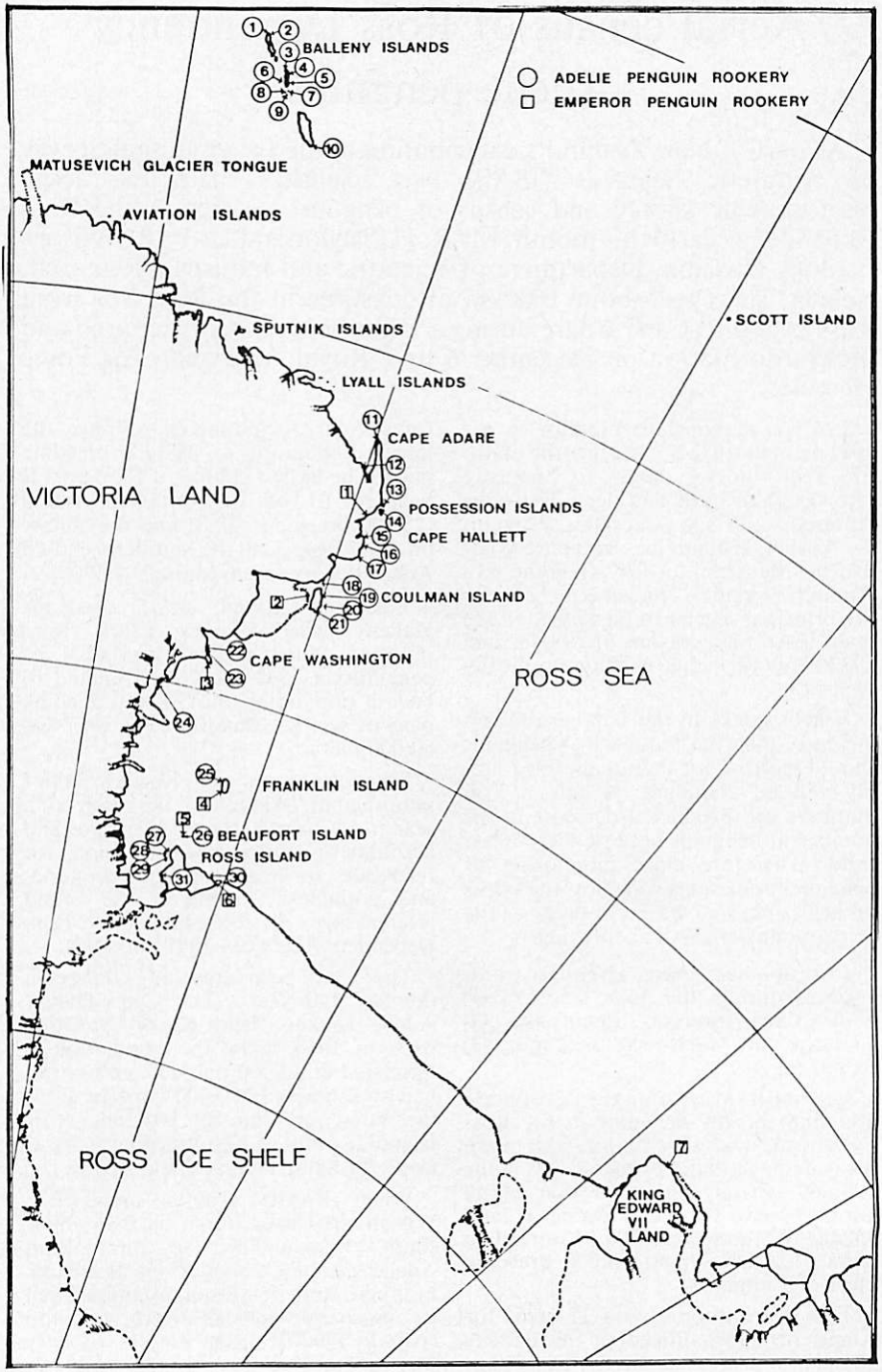
This distribution covers 31 areas for Adelie penguins, including the Balleny Islands, and seven areas for Emperors. Cape Adare is estimated to have the largest population — 289,500 breeding pairs. The largest colony of Emperors is believed to be on Coulman Island (25,000 breeding pairs), and the colony on Cape Roget at the southern end of Adare Peninsula has another 11,700.

Possession Island, north of Cape Hallett, where James Clark Ross reported "inconceivable myriads" of penguins in 1841, now is estimated to have a population of 130,000 breeding pairs of Adelies. An estimate in 1957 was 50,000 pairs.

Seventeen years ago Rowley Taylor published in "Antarctic" the results of a search of early Antarctic literature and accounts of most recent expeditions for references to Adelie penguin rookeries and population estimates. He found references to 22 rookeries in the Ross Dependency between 1841 and 1964.

There have been interesting changes in the last 140 years. The Cape Hallett Adelie rookery held 62,000 breeding pairs in 1964. Now the population is estimated at 50,000 pairs. Cape Crozier had an estimated 250,000 pairs in 1957; the latest estimate is 102,500. Ross Island also has 35,500 breeding pairs at Cape Bird and 1500 at Cape Royds.

When Rowley Taylor and Peter Wilson left Christchurch on their flight south they planned to photograph Adelie penguin colonies on Beaufort, Franklin, and Possession Island as well as those along the Victoria Land coast. In 1960 Beaufort Island's rookery was reported to have 15,000 pairs. A


BALLENY ISLANDS
ADELIE PENGUIN ROOKERY
EMPEROR PENGUIN ROOKERY
MATUSEVICH GLACIER TONGUE
AVIATION ISLANDS
SPUTNIK ISLANDS
SCOTT ISLAND
LYALL ISLANDS
CAPE ADARE
VICTORIA LAND
POSSESSION ISLANDS
CAPE HALLETT
COULMAN ISLAND
CAPE WASHINGTON
ROSS SEA
FRANKLIN ISLAND
BEAUFORT ISLAND
ROSS ISLAND
ROSS ICE SHELF
KING EDWARD VII LAND

very large rookery — more than 25,000 pairs — was reported on Franklin Island in the same year.

Because of the large number of penguin colonies the only way a census of birds can be made quickly is to photograph them from the air. Rowley Taylor and Peter Wilson took oblique photographs from the Hercules wile flying at 300m. When the pictures are analysed and head counts made, the census will allow valid comparisons to be made between different penguin colonies, and provide an objective baseline from which to monitor trends in the Ross Sea region.

Robert Falla Memorial Award

A memorial to recognise Sir Robert Falla's long and distinguished contribution to the study and protection of birds has been established by the Ornithological Society of New Zealand. The memorial takes the form of a substantial annual award of a book token and a suitably designed bookplate.

When the council of the Ornithological Society Society names the recipient of the Robert Falla Memorial Award it will be guided by the winner's contribution to the study of birds in New Zealand and the Southern Ocean, his or her service to the society, and concern for the welfare of New Zealand's birds. The society has made an award for 1980, the first recipient being Mr H. Ross McKenzie, a noted naturalist and author of "In Search of Birds in New Zealand."

Although the appeal for funds to establish the award has met with a favourable response money is still needed. Mr R. B. Sibson, president of the Ornithological Society, hopes members of the New Zealand Antarctic Society might be interested in the appeal.

Sir Robert Falla, who died in 1979, is remembered as a distinguished ornithologist and conservationist. His contribution to Antarctic research, particularly on seabirds, was equally outstanding. He was president of the Antarctic Society in the early 1950s, and was associated with Antarctica and the sub-Antarctic islands for 50 years.

Antarctic Society members can send their donations marked "Robert Fal;la Memorial Appeal" to Mr G. M. H. Peterson, honorary treasurer, Ornithological Society of New Zealand, P.O. Box 22-230, Auckland 6, New Zealand.

Remote TV viewers

New Zealand television programmes — and even the commercials — now have a small but enthusiastic viewing audience nearly 2500km away at Scott Base. Men and women working there this summer are able to watch overseas and New Zealand-made programmes, and news and sports programmes which have been video taped in Chirstchurch.

Air New Zealand provided video and television equipment at Scott Base in recognition of the work done there after the DC10 crash on Mt Erebus, and video equipment has been installed at the Antarctic Division's office in Christchurch. Since early September 40 video tapes have been sent to Scott Base.

Major film on Scott

A multi-million dollar film about Captain Scott is planned by the British director and producer, David Hemmings. He announced in Christchurch last month that the film would probably be shot in the Southern Alps of New Zealand, and the Pisa Range in Central Otago in September and October next year.

Mr Hemmings, who directed the film "Race for the Yankee Zephyr" in Queenstown last year, said he would like to take a small second film crew down to Antarctica next season. It was unlikely that he would be directing the film.

ANARE REPORTS

Ice-core drilling on Law Dome

As part of the Australian National Antarctic Research Expeditions (ANARE) summer research programme an ice-core drilling project designed to obtain ice samples from deep beneath East Antarctica's ice-cap is being carried out on Law Dome, near Casey Station. Four members of the Antarctic Division's glaciology section were flown to Casey early last month by way of Christchurch and McMurdo Station, and will work at the drilling site for three months.

Two holes will be drilled at Cape Folger, 30km north-east of Casey, using thermal drilling equipment. The first hole is expected to yield a core 260m to 300m long; the second a core around 300m. The longest core obtained so far by the Antarctic Division's thermal drilling equipment is 488m in 1977 on the summit of Law Dome.

Samples of ice obtained will be used to study the ice-cap and climate of the region over the last 20,000 years, and to continue investigations of the way ice moves within the ice-cap. After drilling the bore-holes will be logged for inclination, diameter, and temperature, and evidence of natural and man-made atmospheric fall-out. They will be monitored for several seasons to obtain more knowledge of the ice-cap.

Sites for the holes were chosen after an ice radar survey of the bedrock in the Cape Folger region last summer. The van housing the drilling equipment, and a refrigerated core storage van were taken to Casey by ship last January. The refrigerated van, which will be used to take the ice cores back to Australia, is needed because temperatures at Cape Folger often exceed 0 deg Celsius.

After the glaciological party arrived from McMurdo Station on November 7 the drill van, refrigeration van, and living and support vans, were towed to the drill site over a proven crevasse-free route. Assistance was provided by members of the 1981 winter party.

Drilling, will be carried out around the clock by two-man shifts. The reason is that the drill site is close to the coast, and the ice is expected to be moving quickly. Internal ice movement at different speeds also may distort the holes during drilling.

Members of the drilling team are Tony McCray and Peter Hicks (glaciologists) Egon Wherle (diesel mechanic) and Adrian Blake (electronics technician). Tony McCray carried out the ice radar survey for the drilling programme when he was at Casey last summer, and Egon Wherle made extensive modifications to the drill rig before it was shipped south.

Peter Hicks wintered at Casey last year. He will check the drill holes for natural and man-made atmospheric fallout trapped in the ice. Adrian Blake wintered at Mawson in 1979, and after the drilling project will winter at Casey as a radio technician.

In addition to the glaciological team 17 other men arrived at Casey several weeks before the rest of the relief party. They were flown from Christchurch to McMurdo Station in a United States Air Force Starlifter, and then to Casey by a United States Navy ski-equipped Hercules aircraft. The 1982 winter party of 11 and the summer party both included construction workers from the Department of Housing and Construction who will continue the replacement of existing facilities at Casey. There was also a botanist from the University of Melbourne in the summer party.

A winter and summer diving programme to study the marine ecosystem in the waters off Davis Station will begin this season, and is expected to run for the next three years. Since 1973 the biological programme at Davis has concentrated on the Vestfold Hills (including the highly saline lakes) and nearby islands just offshore.

The aim of the new programme is to survey the botany and zoology of the waters to a distance of two to three kiolometres offshore. Very little is known about the ecology of this close inshore area of Antarctica, not only near Davis but also around the whole of East Antarctica.

Studies will be made of algae found on the underside of sea ice. They are believed to play an important part in winter cycle of such zooplankton as krill. When the survey is completed comparisons will be made between the biota found in the saline lakes of the Vestfold Hills and that now found offshore.

These lakes are known to have been formed some 6000 years ago when the land rose, cutting off arms of the sea at that time. The lakes contain a flora and fauna that have been separated from present-day communities in the ocean for 6000 years.

Six Australian geologists have begun work in Northern Victoria Land with the international geological survey organised by the United States National Science Foundation. Three of them are with New Zealand field parties. One of the six, Dr Barrie McKelvey, is actually a New Zealander, who is with the geology department, Unversity of New England, Armidale, New South Wales.

Australian members of the 1981-1982 Northern Victoria Land project are: Dr Andrew Gleadow, geology department, University of Melbourne; Dr Jim Jago, School of Applied Geology, South Australian Insititute of Technology; Dr Robin Oliver, geology department, University of Adelaide; and Dr John Sheraton and Bob Tingey, Bureau of Mineral Resources (geology and geophysics), Department of National Development and Energy, Canberra.

An expedition to survey the seabed around Macquarie Island in January is being prepared by the Division of National Mapping, Department of National Development and Energy. The expedition will use the vessel Cape Pillar, which made a similar survey of Heard Island two years ago.

Soundings will be made near the island, and the positions of the Bishop and Clarke rocks, and Judge and Clarke rocks, to the north and south will be determined. In addition four surveyors from the Tasmanian Lands Department will carry out observations on the island for a 1:25,000 map, which will be four times more detailed than the present map.

A group of seven from the Division of National Mapping will take part in the expedition. The leader will be a surveyor, John Corcoran, who wintered at Casey in 1980. Present plans are for the Cape Pillar to leave Hobart on January 14, spend about 10 days near the island, and return on February 4.

Plans to replace R.R.S. Shackleton

Tenders for the replacement of the Royal Research Ship Shackleton at a cost of £4 million for delivery in two years have been issued by the Natural Environment Research Council. The Shackleton was used for Antarctic relief and research duties from 1955 to 1969, and last season made a geophysical cruise in the Scotia and Weddell Seas with a University of Birmingham expedition.

Built in Sweden in 1954 the Shackleton was bought by BAS in 1955 and made her first Antarctic voyage that year. The decision to replace her with a new ship — the Bransfield — was made in 1968. She was then transferred to the Natural Environment Research Council's research vessels unit.

Research expedition to Commonwealth Bay

A second Antarctic research expedition organised by the Oceanic Research Foundation was expected to leave Sydney this month in the 21m auxiliary schooner Dick Smith Explorer. The expedition, led by Dr David Lewis, will spend more than two months in Antarctica, and will work off the French station, Dumont d'Urville, and around Commonwealth Bay where Mawson established the main base of his Australasian Antarctic Expedition (1911-14).

Dr Lewis, the New Zealand-born navigator and ocean voyager, led the Oceanic Research Foundation's first expedition in the 17.3m yawl Solo. During the 1977-78 summer the expedition worked around the Balleny Islands and in the Cape Adare region.

A steel auxiliary vessel, the Dick Smith Explorer, which was designed by Herreschoff has a 120 h.p. diesel motor, giving her a range of 4000 nautical miles under power. Her hard chine hull is shaped to withstand ice pressure by lifting if she is caught in the pack. She is equipped with an echo sounder, radar, and a powerful radio set.

There are five other New Zealanders in the expedition. Mrs Dorothy Smith, a mountaineer, did most of the cooking with the Solo expedition, Dr Harry Keys, a geochemist, has spent six seasons in Antarctica with the New Zealand and United States research programmes, and his assistant, Karen Williams, was information officer at Scott Base in the 1978-79 season.

Other members of the crew include Margaret Huenerbein, a founder member of the Oceanic Research Foundation, who has had climbing experience in the Himalayas Dick Heffernan, assistant oceanographer, who has climbed on Tierra del Fuego, Garry Satherley, diesel mechanic and yachtsman, Don Richards (radio operator), Malcolm Hamilton (cameraman), and Barbara Muhvich (journalist). Two New Zealand biologists in the crew are Paul Ensor and Jeni Bassett, who have both spent several summers in Antarctica. They will study marine life, keep whale and seabird logs, and examine krill, plankton, and seals.

A proposed itinerary for the expedition printed in an Oceanic Research Fundation publicity brochure provided for the Dick Smith Explorer to sail from Sydney on December 12, reach Hobart on December 18, remain there about three days, and then head south. The voyage to Dumont d'Urville was expected to take 2½ to 3 weeks, the estimated arrival date being January 14.

After a week at Dumont d'Urville the expedition planned to leave on January 21 for Commonwealth Bay and arrive there on January 24. Ice conditions permitting, expedition intended to remain there for about four weeks, sailing on February 23.

One of the major projects in the expedition's scientific programme is a detailed study of an iceberg. When the Dick Smith Explorer leaves Commonwealth Bay the expedition plans to find a suitable iceberg for study, and the ship will remain with it for about three weeks.

On March 6 the Dick Smith Explorer is expected to leave the iceberg and sail for Sydney. She may call at Macquarie Island as Solo did in 1978 on her way back to Australia. Her arrival date in Sydney has been fixed at April 8.

U.S. science projects this summer

United States expenditure on research in Antarctica next season could be affected by budgetary restraints. Scientific projects and logistic support for the 1981-82 season have been planned on an expected budget of $71 million. Included in the cost of the programme, which is financed and co-ordinated by the National Science Foundation, is about $47.8 million to support the research with aircraft icebreakers, and cargo ships, and to maintain the four American inland and coastal stations.

Expenditure this season can be continued up to the limit of last season's budget of slightly more than $55 million. But any additional amount could be affected by the United States Government's proposal to cut by 12½ per cent spending by all government agencies. A reduction of $8.8 million would affect planning for the 1982-83 seasons and the number of projects in the programme.

This season more than 270 scientists, including 21 women, and representatives of nine countries, are engaged in research on the continent, and in southern waters. With air and sea support they are at work around the Antarctic Peninsula, in Ellsworth Land, at the South Pole, on the East Antarctic icesheet at Dome C, in the mountains of Northern Victoria Land, on Mt Erebus, around McMurdo Sound, and in the Ross and Weddell Seas.

There are 81 projects in the United States Antarctic Research Programme (USARP) and they include evaluation of Antarctica's mineral and marine living resources. One of the major projects — the first on the eastern side of the Antarctic Peninsula is the study of fossils on islands in the Weddell Sea to learn more about the history of Gondwanaland, the southern supercontinent, and to look for the fossil tracks of marsupials.

Scientists from Ohio State University, the University of California, Riverside, Texas Tech, and the Colorado School of Mines, will be transported to the James Ross Island area from Punta Arenas on February 14 by the United States Coast Guard icebreaker Glacier, and will be picked up again on March 14. The main party, led by Dr William J. Zinsmeister, of Ohio State University, will study the sedimentology and invertebrate paleontology of the area on James Ross, Seymour, Cockburn, and Dundee Islands.

PLANT GROUPS

Another party led by a New Zealand geologist, Rosemary Askin, now at the Colorado School of Mines, will coordinate its work on the same islands, and on Snow Hill and Vega Islands, with the work of the other party. The two scientists will examine fossil palynomorphs (pollen, spores, and dinoflagellates) from sedimentary rocks. It hopes to provide new data on the origin of various southern plant groups, and the paths and rates of dispersal during the final Gondwanaland fragmentation.

To gain understanding of the evolution of the northern Antarctic Peninsula in relation to the development and breakup of Gondwanaland the scientists will go to the James Ross Island area because it contains the Southern Hemisphere's best fossil record of the geologicl period between the late Cretaceous and early Tertiary — from 100 million to 30 million years. In the

1974-75 season a United States-Argentine research team discovered that rocks in the area were liberally sprinkled with plant and animal remains.

Among the fossil remains on Seymour Island are those of giant penguins about 1.8m tall. Emperor penguins now average 1.1m in height. Fossil remains of whales, large marine reptiles, sharks, clams, snails, and starfish, have also been found. Seymour Island is treeless but on it are fossilised tree trunks .9m in diameter.

Another major goal of the scientists is to look for traces of marsupials to test a hypothesis that these mammals, now common in Australia, originated in North America, and migrated through South America to Australia. If this happened, these mammals had to cross Antarctica when it was part of Gondwanaland. To find fossil traces of the marsupials would be one of the major paleontological discoveries in Antarctica, and would give much credence to the marsupial migration theory.

GEOLOGICAL STUDY

Another major project is the geological study of Northern Victoria Land. About 60 scientists from 10 universities, and from New Zealand, Australia, and West Germany have been at work in mountain areas since early November and will finish their studies about the middle of January.

This project is the fourth major remote helicopter-supported geological study of Antarctic regions in recent years. Similar studies have been made in Marie Byrd Land, the Ellsworth Mountains area, and the Darwin Glacier (glaciology). In Northern Victoria Land about 37 United States scientists, including two women, are working in remote areas to which they have been taken by helicopter from a base camp on the Evans Neve 700km from McMurdo Station.

As well as gathering evidence to support the theory of continental drift, and the links between Antarctica and Australia, the geologists are attempting to find out more about the relationship between the Trans-Antarctic Mountains and the Antarctic Shield which consists of rocks up to 4000 million years old. Northern Victoria Land is an ideal site for study because its mountain ranges form a belt of exposed rock up to 400km wide.

Better knowledge of the geology of Northern Victoria Land is expected to provide a basis for possible resource evaluation in future seasons. One resource and radioactivity survey is now carried out in the region this season.

URANIUM SURVEY

This survey was begun in the 1975-76 season to assess the potential resources of uranium and thorium in the exposed rocks of Antarctica. A team from the University of Kansas is using an airborne gamma-ray spectrometer to survey rock types and geological formations which in other areas have had concentrations of radioactive elements.

Of particular interest are the Wilson Group outcrops, the Cambrian Bowers Group in the Bowers Mountains and Lanterman Range, Granite Harbour intrusives in the Freyberg Mountains (which may have radioactive deposits similar to those found in the Darwin Glacier area) and the Ferrar Group dolorites and basalts. After completion of the survey in helicopter range from the Evans Neve base camp the University of Kansas team will transfer operations to the area where the second West Geman expedition, GANOVEX 81, is operating. As part of a co-operative agreement the team will make use of the five West German helicopters to extend the area of its survey.

A survey of a portion of the Antarctic continental margin in the Northern Weddell Sea and Bransfield Strait, which is expected to provide information about the hydrocarbon potential, will be made by a marine geological field team from Rice University, Houston, Texas, during the voyage of the United States Coast Guard icebreaker, Glacier, from McMurdo Station to Palmer Station. Last season a team from the same university made a similar survey in the Bellingshausen Sea and along the Antarctic Peninsula, and in the 1979-80

season a geological survey was conducted on the continental margin of the d'Urville Sea between 140deg E and 150deg E.

This season core samples of ancient sediments will be taken, and the team will examine glacial and non-glacial sedimential processes, survey iceberg sediment transport, and conduct bottom sampling of benthic foraminifera. The continental margin survey will also include detailed bathymetric maps, plotting of ice fronts, and the acquisition of geological samples.

MARINE SEDIMENTS

Scientists from the University of Maine will study marine sediments from the Weddell, Amundsen, and Ross Sea continental shelves to test a model of glacial formation, growth, and recession as well as the extent of the last maxium glacial period — from 17,000 to 21,000 years ago. Glacial geologists support different models for ice dynamics. The maximum model looks on marine processes as the primary cause of the advance and retreat of ice sheets extending over continental shelves of bordering oceans; the minimum model envisions land-based ice sheets whose dynamics are governed by atmospheric processes. Verification of one or the other is essential to understand the role of cold regions in climate variation.

Field research in the Antarctic peninsula area this season is related again to the Antarctic ecosystem, and studies of krill, birds, and penguins. Marine biologists from the University of North Carolina are studying the growth and metabolism of krill and other deep-sea crustaceans, and how they adapt to their environments. The study is being conducted from Palmer Station on Anvers Island aboard the research vessel Hero. Among the objectives are determination of how species have adapted to temperatures, and how pressure affects the early embryo of krill.

In another krill study which will last two seasons biologists from the University of California, Los Angeles, will examine the behaviour of krill in patches, a phenomenon that has broad implications at all levels of the Antarctic food chain. Divers will use photography to obtain detailed information on the density, orientation, and size if krill within patches. Some krill will be captured for use in laboratory studies to determine how they respond to varied physical and chemical stimuli.

Another team from the University of California, Santa Barbara, working primarily in Bellingshausen Sea and in Bransfield Strait will sample and observe live, spawning krill. The purpose is to determine the seasonal and area variations in daily egg production. Another objective is to indentify the time scale for the nutritional history of krill.

KRILL FEEDERS

As part of a three-year project a team from the University of Maine at Orono has obtained detailed information on the food preferences and feeding behaviour of echinoderms, including starfish, found on the Antarctic shelf. This season the team will concentrate on the extent to which these echinoderms feed directly and indirectly on krill, other zooplankton, and animals on the sea floor.

To obtain data the team will use trawls, plankton traps, nets, and underwater photography along the Antarctic Peninsula, and off the South Shetland Island. It will be supported by the Hero in the Argentine Islands, Melchior Islands, Dallman Bay, Neumayer Channel, and the Palmer Station area.

Biologists from the Point Reyes Bird Observatory, California, will make a comparative study of the behaviour and ecology of krill-consuming penguins (Adelie, Chinstrap, and Gentoo) at Point Thomas, Admiralty Bay, on King George Island in the South Shetlands. Previous research suggests that changes in the breeding success of these species may reflect changes in the abundance of krill. Data will be gathered on the feeding preferences of adults, and efforts will be made to determine the

amount of food required by birds to raise their chicks.

Studies of protein metabolism in Antarctic marine organisms, principally fish and krill, that live at extremely low temperatures all the year round, which were carried out at McMurdo Station and in the Ross Sea for the last seasons by a biological team from Hunter College, New York, are being continued at Palmer Station this season. The team is collecting live fish samples to evaluate synthetic demands for metabolism, growth and reproduction, and will compare the changing patterns of liver protein synthesis, particularly anti-freeze glycoprotein and egg proteins, to seasonal and reproductive stages.

SIPLE STATION

Siple Station in Ellsworth Land about 2045 km from McMurdo Station, which was closed at the end of last season, was reopened last month. This season a team from Stanford University's electrical engineering department is conducting active and passive VLF wave-particle experiments on the magnetosphere. Other upper atmosphere studies include the installation of a computer-controlled ionospheric sounder by a Utah State University team. It will be used to determine the amplitude, phase, polarisation, doppler shifts, and arrival direction of radio signals reflected from the ionosphere.

There will be a winter team of eight at Siple next year. Upper atmosphere studies will be continued to investigate VLF transmission induced particle interactions. Additional work on "coherent wave instabilities" will be prepared through transmissions to the Dynamics Explorer satellite during the winter.

Scientists at the Amundsen-Scott South Pole Station will study the magnetospheric cusp, a unique region where solar wind plasma or ionised gas can freely enter the earth's magnetosphere and produce instabilities in the ionosphere. This is the second year of a long-range study of the cusp. It will be made by scientists from Utah State University, Stanford University, University of Minnesota, and New Hampshire, and Bell Laboratories. Rockets and satellites will be used for future studies.

Surface features of the sun such as supergranules, which are specks each about 1609km in diameter, will be observed with a telescope set up in a tower 8.2m high and 6.4km from the Pole Station. The telescope has been installed in an observatory built last year. Scientists from the Bartol Foundation at the University of Delaware, and the solar observatory of the Royal Swedish Academy of Science, will make the observations. One of the American team is a Chinese scientist, who has been doing graduate work in the United Sates, Mr Chang-hua Tsao is the first scientist from the People's Republic of China to work at the South Pole.

CLIMATIC CHANGES

Geophysical monitoring for climatic change will be continued at the Pole Station this summer and next winter by a team from the National Oceanic and Atmospheric Administration. The team will make long-term measurements of trace atmospheric constituents that may influence climate. Two winter staff next year will measure carbon dioxide, surface ozone, winds, pressure, air and snow temperature, atmospheric moisture, and other trace constituents from the clean air facility at the Pole.

During the summer a 200-250m ice core will be obtained at the Pole Station by a team from the University of Nebraska. A New Zealand scientist, Dr Gerald Holdsworth, of Environment Canada, who has designed the drill, will be in charge of the drilling. After sampling at the Pole the ice core will be returned to the United States for analysis by individual research projects.

United States and French glaciologists will work together again at Dome C on the East Antarctic ice-sheet about 1158km from McMurdo Station. A geophysical investigation of the area will be conducted by a University of Wisconsin team, which began the project in the 1978-79 season. It included a gravity and magnetic survey, radar profiling along gravity and seismic lines, and tests and modification of a new computer-controlled radar system. Deep seismic

tests, magnetotelluric studies, and completion of a gravity and magnetic network are included in this season's programme which will last nearly two months.

Ice flow changes, using a linked strain network, will be recorded by a team from Ohio State University, which will make another traverse to a site 100km from Dome C established in the 1978-79 season. Snow stratigraphy and temperature profiles will provide data on climate effects on ice near the surface. Research will be conducted in conjunction with the University of Wisconsin's geophysical project, a French glaciological project, and airborne radar sounding investigations.

A field team from the French Glaciology Laboratory at Grenoble will use a melting probe (climatopic) boring device which allows continuous ice sampling. The team will also recover samples from the previous 905m coring, conduct some surface tests, and examine French equipment at the site.

MAJOR PROJECT

A major project on Ross Island will be the continuing study of Mt Erebus by United States, Japanese, and New Zealand scientists. Their purpose is to obtain a better understanding of the volcano's magma lake in the active crater, and to obtain a long-term record of seismic activity.

With Japanese and New Zealand cooperation scientists from Ohio State University, the New Mexico Institute of Mining and Technology, and the University of Alaska, will instal a fourth permanent seismic recording station on the east flank of Erebus. Three such stations with radio telemetry links to Scott Base were established last year. Monitoring the four stations will help to provide a more complete record of seismic activity.

As in past seasons most of the research in the McMurdo Sound area will be concentrated on seals and fish, but seismic and gravity measurements of the earth's crust and upper mantle will be made between the Dailey Islands and the Nordenskjold Ice Tongue by a team from Northern Illinois University. Scientific objectives include determination of the thickness of glacial and pre-glacial sediments in the McMurdo sedimentary basin, and determination of the crystalline basement in the basin.

SEAL BEHAVIOUR

A long-term project — monitoring the Weddell seal population in McMurdo Sound — begun several seasons ago by University of Minnesota biologists, will be continued this summer, but the focus will be on the interaction between the Antarctic cod (Dissostichus mawsoni) and the seal. Special consideration will be given to factors in the late summer and winter ecosystems that may contribute to the life cycles and distribution patterns of both species.

Four scientists who studied the winter behaviour of Weddell seals in White Island and in McMurdo Sound completed their observations in December. They were joined at the end of August by four other members of the team who had worked on the project last summer. The distribution data they have obtained by direct observation and remote sampling with time-depth recorders attached to the seals, will provide new information on important aspects of Weddell seal ecology, behaviour, and physiology.

During the last two seasons a team from the University of Illinois led by Dr Arthur L. DeVries has discovered several aspects of the way that certain Antarctic fish synthesize a unique glycoprotein anti-freeze which enables them to live in ice-laden waters. This season, working in McMurdo Sound and at the Dailey Islands, the team will continue to examine why two Antarctic fish, Trematomus and Dissostichus mawsoni apparently maintain constant levels of the anti-freeze even at higher temperatures.

AGE OF SKUAS

Surveys in past seasons have indicated that south polar skuas live to be between 40 and 50 years old, and their age structure is affected by weather and other environmental factors. Last season ornithologists from Point Reyes Bird Observatory, California, found 216 skuas at Cape Crozier aged from 10 to

19 years. About 60 per cent were 18 years old and had been tagged during the 1962-63 season.

This season the scientists will continue their survey of previously banded birds to estimate survival, longevity, and emigration. Besides visiting skua rookeries in the McMurdo Sound are the team will travel by icebreaker later in the season to visit skua rookeries on Beaufort, Franklin, and Inexpressible Islands, and at Capes Hallett and Adare.

High concentrations of meteorites have been found in the Allan Hills region of Victoria Land, and two members of a University of Pittsburgh team will conduct ice movement and ablation studies there, and extend a previously-established triangulation grid. A second group will search for meteorites at the principal concentration site at Allan Hills, and at two ice patches further west. This group, if not fully occupied at the Allan Hills site, will also visit another concentration site at Elephant Moraine.

Endolithic micro-organisms — life inside rocks — which exist in snow-free arid areas of Antarctica, will be studied again in the season by a team led by Dr E. Imre Freidmann, of Florida State University. The team, which includes Dr Friedmann's wife, will work in the dry valleys near the Asgard Range and the Walcott Glacier. Its research will include lichen taxonomy, the chemistry, leaching, and biological weathering of rocks, non-photosynthetic endolithic bacteria, micro-meteorology, and the yearly nitrogen accretion in rocks.

LAKE STUDIES

A search for algae specifically adapted to cold temperatures, high salinity, low light, low phosphate, and other nutrients, will be continued by a team from the Virginia Polytechnic Institute and State University in the lakes of the dry valleys. Last season the team identified five types of living stromatolites in Lakes Bonney, Hoare, Vanda, and Fryxell. It will work at these lakes again to sample organisms, especially at greater depths with scuba diving equipment.

To obtain data on the weather and climate of the Antarctic Peninsula, which are not well-documented the installation of four automatic weather stations in an area between 60deg W and 69deg W will be completed this year. Two new sites for automatic weather stations are proposed east and north of Ross Island. One will be at the eastern end of the island (77deg 30min S/170deg E) and the other on either Franklin Island or Beaufort Island. Both islands lie to the north of McMurdo Station in the Ross Sea.

Eighty years after Scott used a windmill on the Discovery to generate power a study of the feasibility of using wind power to produce a significant part of the electricity needed at McMurdo Statio will be conducted by scientists from the University of Arizona. Their engineering and economic study will examine the possiblity of using wind turbines to share the load with McMurdo Station's present generators, and so reduce fuel costs.

Information will be provided on such questions as the availability of winds and the best site for the wind turbine, the availability of suitable commercial wind turbine generator designs, and the cost of a wind power and diesel combin ation compared with the present all-diesel system. The study will take six months, and the contract wil cost the National Science Foundation $67,558.

Sub-Antarctic defector

A Soviet scientist, Dr Vladimir Sankovich, who headed a team engaged in upper atmosphere research at Port-aux-Francais, Iles Kerguelen, this winter, asked the French scientific team there for asylum on August 6, one day before his team was to be relieved by a Soviet ship. His action was announced by the French Foreign Ministry, and he is now in Paris.

A Franco-Soviet scientific agreement, which has been in force for several years, allows Soviet scientists to work on Iles Kerguelen, the French sub-Antarctic territory. Results of joint cosmic rays research have been transmitted to the University of Leningrad, using the Franco-Soviet satellite, ARCAD III.

BAS NEWS

Halley Station will be replaced

Halley, the British Antarctic Survey station on the Brunt Ice Shelf off Coats Land, which was built in 1973, is coming to the end of its useful life and is to be replaced in the 1982-83 season. By that time it will be about 19.8m below the surface and considerably nearer the front of the ice shelf, which is now moving about 3.6m a day. Plans to rebuild the station on a site about 24km from the present buildings have been approved by the Natural Environment Research Council which is responsible for B.A.S. research activities in Antarctica. The estimated cost is £1 million.

First established in the 1955-56 season, Halley was completely rebuilt in 1967. A new base was built in the 1972-73 season, and became fully operational in the next season. The 1967 buildings have now been finally abandoned, all remaining useful equipment and materials having been retrieved.

As an economy measure the station at Grytviken is to be moved this season from its main building to a smaller one at Kind Edward Point. The winter complement will be reduced from 18 to eight.

Both buildings are remnants of a government settlement abandoned in 1969 after the whaling stations closed. The main building has always been much too large for BAS requirements. It has been very difficult to maintain, having been built originally as an administrative centre and hospital for the whalers.

On September 16 the new season began when the Royal Research Ship John Biscoe sailed from Southampton under the command of Captain C. R. Elliott. After a brief call at Rio de Janeiro the ship proceeded direct to Bird Island at the western end of South Georgia, arriving there on October 15.

WINTER TEAM

A party of biologists was landed to continue work on the fur seals and birds. It was accompanied by two builders who are constructing a hut in which three of the biologists will winter. They will be first BAS winterers at Bird Island, but a three-man United States research programme party was on the island throughout 1963, and BAS has supported summer work there since 1971.

Then the ship sailed along the north coast of South Georgia to Grytviken Station. On the way back to Bird Island, she landed two women — wildlife photographers Cindy Buxton and Annie Price — at St. Andrews Bay, where they will film King penguins and elephant seals. They have previously made films on wildlife in the Falkland Islands.

Unloading at Bird Island was delayed for two days by rough seas, but once started was quickly completed. Two more biologists were then established at the Schlieper Bay (South Georgia) fur seal colony and the ship proceeded to the Falkland Islands, encountering a strong gale en route.

With more men on board, the John Biscoe sailed south again, this time to try to land a geological party on James Ross Island on the southern side of the north-eastern tip of the Antarctic Peninsula. The approaches to it were blocked by ice, but the men were landed at Hope Bay and were able to travel by motor toboggan over the Tabarin Peninsula

and down Prince Gustav Channel to the island.

STORES LANDED

Plans to establish a party there last year by air were thwarted by the unusually late arrival of the Twin Otter aircraft in the Antarctic, but the ship had succeeded in placing a depot on the island in February, 1980.

Leaving the area, the John Biscoe headed for Damoy air facility, Wiencke Island, on the west coast of the Antarctic Peninsula, arriving there on November 6. Men and stores were landed for onward transport by air to Rothera and southern field-work sites, and the ship returned to the Falklands by way of the Chilean station Presidente Frei in the South Shetlands. The next voyage will be to relieve Signy, in the South Orkney Islands, and resume work on the long-term Offshore Biological Programme around South Georgia.

R.R.S. Bransfield sailed from Southampton on October 28, under the command of Captain M. J. Cole.

NEW AIRCRAFT

Two Twin Otter aircraft are again in service this season. One which had been badly damaged at the end of last season and had been shipped home, was repaired and flown south in early October, arriving at Rothera in the middle of the month.

After a brief visit to Punta Arenas, Chile, dropping supplies at Faraday, and visiting Presidente Frei en route, the aircraft arrived back at Rothera in early November. The second aircraft, a new one, arrived from De Havilland's, Toronto, two days later.

An airlift of men and supplies from Damoy began immediately. The snow runway at Damoy was found to be in excellent condition, and although, as usual, some delay was caused by bad weather, the first of the field parties were soon established at work-sites in northern Marguerite Bay.

Preparation for the aircraft's arrival had begun in September, when the runways 4.8km inland on the piedmont glacier had been marked out and provided with fuel, the refuge caboose jacked up and automatic meteorological equipment installed. Once this work had been completed, other journeys were undertaken in southern Adelaide Island and to several adjacent islands, using dog teams and motor vehicles. The automatic weather station is one of five being deployed for a climatological study of the southern part of the Antarctic Peninsula by BAS and the Universities of Stanford and Wisconsin.

SHORT JOURNEYS

Several short journeys were also undertaken from the other stations. On South Georgia the advent of better weather encouraged parties further afield. Two visited the Nordenskjold Glacier, one reaching the Ross Pass on the island's central ridge, 40km to the south-east, from which it had an excellent view of Annenkov Island. A third party visited some of the old whaling stations.

On Signy Island, the men took advantage of the combination of good sea ice and longer days in September to travel to the neighbouring Coronation Island. One party also travelled to the eastern end, and to the Robertson Islands 24 km the east.

A number of islands was visited from Faraday — including Petermann Island where the French yacht Kim with its four-man crew was still based. Two parties also travelled to the mainland, one of them climbing Mt. Demaria.

Work continued on fitting out the new Faraday building. A fire in a small outbuilding in August unfortunately destroyed most of the remaining meat supplies, but these were partially replenished when the aircraft flew over in October.

RETURN OF SUN

At Halley, the return of the sun on August 11 enticed more men outside and, as the days lengthened, they were able to begin sea ice observations again and visit the local Emperor penguin rookery. Manhauling journeys for physiological research were stoically endured by a number of men in October and November, while their more fortunate colleagues travelled in vehicles to the hinge-zone, to reconnoitre a route

up from the Brunt Ice Shelf to the inland ice. A depot — including a caboose refuge — in the area was located although both depot and markers had been buried by snow and bad weather hampered the party's progress.

Initial Advanced Ionospheric Sounder programmes at Halley are now well established and producing enormous quantities of data. The A.I.S. generator caboose has been successfully jacked up to keep pace with the accumulating snow.

HUT DESTROYED

All scientific programmes have been maintained at the stations, with the exception of the radiosonde programme at Halley which unfortunately came to a halt in August when fire destroyed the balloon hut. As with the small fire at Faraday, it served to make the men even more vigilant in the main buildings.

In conjunction with the marine biological work on Signy, research is being continued into the physiological effect of repeated aqualung dives in very cold water. It has shown that divers are unable to judge how cold they are, and this is of particular importance to Britain's North Sea operations in which several diving fatalities have been attributed to undetected hypothermia.

REINDEER STAMPS

Four Falkland Islands Dependencies stamps depicting the introduced reindeer of South Georgia, will be released at Grytviken this month. Fifteen reindeer, of which 10 survived, were introduced by Norwegian whalers in 1911 and seven more in 1912. The population now totals about 2,000 but is limited by the amount of food available.

In contrast to their traditional diet in the Northern Hemisphere, the South Georgia reindeer have adapted to feeding mainly on the coastal tussock grass, Poa flabellata, and the burnet, Acaena magellanica, of the low-lying areas. Foraging for food, especially during the winter when the ground is thickly covered in snow, has had a deleterious effect on the vegetation.

The few lichen species have been severely affected, the delicate moss banks have been trampled and the burnet over-grazed. Fortunately the main winter forage is tussock grass, which has a high productivity and recovery rate in comparison with the other vegetation.

Rabbits, horses, sheep and rats were also introduced by the whalers (the rats accidentally, of course) but of these only the rats survived. ("Antarctic", September, 1981).

British ice patrol ship for sale

H.M.S. Endurance, the Royal Navy's ice patrol ship, which has supported the British Antarctic Survey's research programme since 1968, has become a victim of recent economies by the Ministry of Defence. She is among surplus ships that have been put up for sale.

Officially the reason for selling the Endurance is that the Royal Navy cannot afford the £3m a year cost of maintaining the ship and its complement of 119 officers and men. It has been suggested that her withdrawal from service would save £3.5m to £4m if the cost of an annual refit is included.

An unconfirmed report from London suggests that the Brazilian Navy is a potential buyer. Brazil has acceded to the Antarctic Treaty, but its Antarctic interests have not been evident except in 1972 when there were reports of plans for a privately sponsored scientific expedition to the Antarctic Peninsula. According to a Rio de Janeiro newspaper report in 1973 the Brazilian Merchant Marine intended to buy a Norwegian laboratory ship for work in Antarctica.

Both Sir Vivian Fuchs, director of the

BAS for more than 20 years, and Rear-Admiral Edmund Irving, former Hydrographer to the Navy, have protested publicly at the Ministry of Defence decision. They say in a letter to "The Times" that some economies which appear of minor importance today can have very serious implications for Britain's long-term future. Any reduction of British interest in the present international activity in the Antarctic and the sub-Antarctic is one of these.

H.M.S. Endurance was originally the Anita Dan, one of the J. Lauritzen ice-strengthened polar ships which the company has operated in Arctic and Antarctic waters since 1952. She was built in West Germany at a cost of £1.8m, and commissioned in December, 1956. In 1967 she was sold to the Ministry of Defence.

Since she was converted for ice operations at Belfast the 3600-tonne Endurance has been used by the Royal Navy for oceanographic and hydrographic surveys, and as the BAS support ship and guard vessel. She has carried scientists to BAS bases, acted as a base for iceberg research by British and Norwegian scientists, and provided search and rescue facilities with her two Wasp helicopers.

In addition to her complement of 13 officers and 106 men the Endurance has quarters for a small detachment of Royal Marines which has been carried to and from the Falkland Islands (Islas Malvinas). She also has 12 spare berths for scientists.

Like other ships operating in Antarctic waters the Endurance is fitted with a Marisat satellite communications system. This was installed during her refit in 1978.

There is one feature of H.M.S. Endurance which distinguishes her from other ships of the Royal Navy — her colour. It is vivid red, not battleship grey. All the J. Lauritzen polar ships ar red for easier observation in the ice. The first of the red ships was the Kista Dan, now the Benjamin Bowring, which made her first Antarctic voyage in the 1952-53 season.

Agulhas to relieve SANAE 22 team

After her voyages to the sub-Antarctic weather stations on Gough Island and Marion Island the South African relief ship Agulhas is expected to leave Cape Town about the middle of this month to relieve Sanae III, the base in Queen Maud Land. She will bring back the SANAE 22 winter team and also make an oceanographic cruise.

When the Agulhas returned to Cape Town at the end of January with the SANAE 21 team she brought back excess equipment from the British Transglobe Expedition which has been stored at Fimbulisen, the expedition base near Sanae III. Arrangements had been made for the equipment to be picked up after the completion of the Antarctic crossing to Scott Base.

On her way back to Cape Town last season the Agulhas stopped at Bouvet Island to replace the batteries of the automatic weather station established by the Norwegian expedition two years ago. She left Cape Town again on February 10 with scientists from the Institute of Sea Fisheries, the University of Cape Town, and the National Research Institute for Oceanology to take part in the First International BIOMASS Experiment (FIBEX).

Between April and June the Agulhas made two voyages to Marion Island. Her next voyage was to Gough Island, and she returned from her third visit to Marion Island at the end of last month.

Her predecessor, the R.S.A., which was withdrawn from service early in 1978 after 17 round trips to Sanae, and many voyages to Marion Island and Gough Islands, has been in dock at Cape Town for several months being modified for a new role. Earlier this year she was handed over to the Seamen's Training Centre. In future she will be a floating classroom for the training of deck officers, engineers, and catering staff for the South African merchant fleet and fishing industry.

JARE-23

Ice studies in eastern Queen Maud Land

Japan's future research programmes will place more emphasis on glaciology over the next five years. From next year a more extensive glaciological survey will be conducted in the east of Queen Maud Land, and a traverse will be made along the 2000m contour from Mizuho Station between the Yamato and Sor Rondane Mountains by way of the Belgica Mountains. Ice core drillings at Mizuho Station and on the traverses are planned.

Geological surveys in the Yamato Mountains, a traverse in the upstream area of the Shirase Glacier, and a search for meteorites on bare ice areas near the Yamato Mountains, are among the projects of the 23rd Japanese Antarctic Research Expedition (JARE-23) this season. The programme will be conducted at Syowa Station and Mizuho Station, about 300km to the south-east on the inland ice sheet, and from the icebreaker Fuji.

For this summer JARE-23 will have the Fuji's three helicopters — two Sikorsky G-61As, and one Bell 47GA — available in the Syowa Station area. They will be used on support operations in January and February. Trials will be continued at Syowa with the Mitsui experimental hovercraft, which was designed for ship to shore use, and inland transport over the ice. It carries a driver and a crew of two and has a payload of 600kg.

This season's programme began officially on November 25 when 44 members of the JARE-23 winter and summer parties, including Masaki Sakurai, of Nara Women's University, left Tokyo on board the Fuji. The leader of the expedition and of the 1982 winter party of 34 is Dr Takao Hoshiai, marine biologist in the National Institute of Polar Research. A glaciologist, Dr Shinji Mae, is deputy-leader of the summer party of 10.

Under the command of Captain Syuichi Takewchi the Fuji called first at Fremantle. She is expected to reach the pack ice late this month. The transport of JARE-23 to Syowa by helicopters is expected to begin early next month, and the relief of the JARE-22 winter party will take place in February.

SUMMER SURVEYS

Last month the JARE-22 teams at Syowa and Mizuho were preparing for summer field surveys. A party from Syowa left for the Yamato Mountains during the month. It is expected to meet a party from Mizuho about the middle of this month.

Upper atmosphere research will be continued at Syowa this season. The programme includes the reception of geophysical data from the scientific satellites ISIS I and II, and NOAA VI and VII. Four balloons fitted with detectors for minor constituents (nitrogen dioxide and ozone) in the atmosphere will be launched from the station. Among other projects are aurora and ionosphere studies, meteorological and seismological observations, gravity and aero-magnetic surveys, and tide observations.

Limnological studies wil be made of fresh and saline lakes, and samples will be taken of soil algae and bacteria. Another environmental science project will be the continuous measurement of atmospheric carbon dioxide and nitrogen compounds.

Marine biologists will make ecological studies of phytoplankton, zooplankton,

and benthos, including demersal fish. Routine oceanographic observations will be made in Ongul Strait, and a census of the Adelie penguin and Weddell sea populations will be conducted.

GLACIER TRAVERSE

Glaciological projects are prominent in the programme planned form February, 1982 to January, 1983, at Mizuho Station, and on the Mizuho Plateau. These include sampling of firn snow cores along traverse routes, and the use of laser-radar equipment to make a surface micro-relief of the Mizuho Plateau.

Ice radar will be used for radio-echo sounding during a stream-line traverse in the upstream area of the Shirase Glacier along the line of 40deg E from 71deg S to 73deg 5min S. A trilateration network about 120km long will be established from the southern end of the Yamato Mountains southward.

Ice-core drilling to be a depth of 100km will be carried out at 71deg/S/40deg E, and another hole will be drilled near the Yamato Mountains. Medium depth drilling at Mizuho Station will be tested.

Scientists at Mizuho will make a surface synoptic observation and glaciological study in the station area. Records of blowing snow will be made at the station, at 73deg 10min S/53deg 30min E, and at 69deg 50mins S/47deg 40min E.

DRIFTING SNOW

Micro-meteorological observations will be made from a 30m tower erected at Mizuho in January, 1979. A micro-meteorological sensor on the tower will enable the scientists to observe the radiation regime, air temperature profiles, wind profiles, vapour pressure, and drifting snow.

Shipboard programmes on the Fuji from November to April next year will cover upper atmosphere physics, marine meteorology, temperature, salinity, and current measurements, and a geodetic control survey of ice-free areas of the Soya Coast.

Biologists aboard the Fuji will measure the chlorophyll content in the surface sea water, and make ecological studies of phytoplankton. A Japanese-speaking Australian exchange scientist, Mr G. A. Duff, of the botany department, University of Tasmania, will work on the Fuji for part of the cruise. He will do research on various aspects of phytoplankton.

ICE FLOWS

From 1982 the JARE glaciological programme will be concentrated in eastern Queen Maud Land where there has been little exploration in past seasons. The main purpose of the programme is a comparative study of ice sheet behaviour on the Mizuho Plateau where the ice flows out through the Shirase Glacier while the Queen Maud Land ice is supposed to be dammed up by a chain of mountains stretching from the Yamato Mountains to the Sor Rondane Mountains.

In the first five years of the programme Mizuho Station will be the centre for glaciological field studies of an area between 20deg E and 50deg E, and from the coast to about 80deg S. An inland station will be maintained for one winter at about 75deg S/30deg E.

Ice-core drillings down to 500m will be carried out at Mizuho Station. Shallow ice coring will be done during the traverses. Small aircraft will be used for observations and logistic support activities in the area to be covered by the programme.

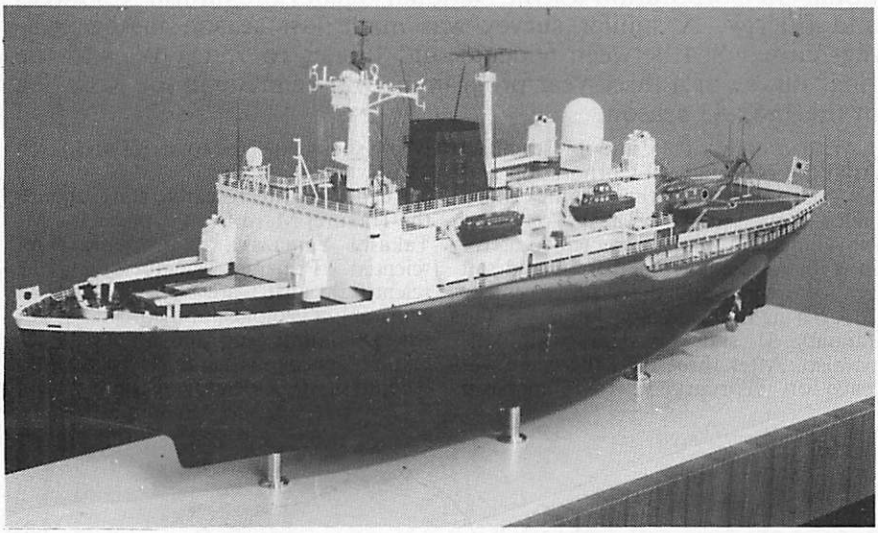
Members of JARE-23 and their duties (surnames first) are:—

Summer staff aboard Fuji (1981-1982) — Mae Shinji, Dr, (deputy-leader glaciologist), Fuchinoue Seiji, (physical oceanographer), Oka Katsujiro, (chemical oceanographer), Ino Yoshio, Dr, (biologist), Okuyama Shuichi, (surveyor), Matsueda Hiroharu, Dr, Motoyoshi Yuichi, (geologists), Takeuchi Sadao, Watanabe Yasuhiro, (construction engineers), Umeki Kawatoshi (general assistant).

Winter staff (1981-1982), Syowa and Mizuho Stations — Hoshiai Takao, Dr, (leader marine biologist), Yoshihira Tamotsu, Shudo Yasuo, Kajihara Ryouichi, Sasaki Masahiko, (meteorologists), Abe Kaoru, (geophysicist), Kuratani Yasukazu, Igarashi Kiyoshi, Fujii Ryoichi, Kikuchi Masatoshi, (upper atmosphere physicists), Chubachi Shigeru, (meteorologists), Nishio Fumihiko,

Takahashi Shuhei, Dr, Ishikawa Masao, Omae Hirokazu, (glaciologists), Datsushima Takayoshi, (geologists), Fukuchi Mitsuo, Dr, Tanimura Atsushi, Ohtsuka Hideaki, (marine biologists), Shimaoka Kiyoshi, (physiologist), Kaneko Seiichi, Okada Hikeo, Shimizu Morio, Kaneko Shuzo, Morita Tomoya, (mechanics), Sone Kosuke, (radiio engineer), Yamazoe Keiichi, Iino Shigeru (radio operators), Endo Yukio, Watanabe Hisayoshi, (cooks), Koyama Fumitaka, Tanaka Hiroyoshi, (medical officers), Sakurai Masaki, Kano Kenzo, (general assistants).

Three members of JARE-23 will take part in the United States research programme again this season. Messrs Kei Terai, Kazuo Shibuya, and Muneo Okayama will make geophysical surveys of Mt Erebus in co-operation with United States and New Zealand scientists. They will also help in the maintenance of existing and additional seismological recording stations on the flanks of the mountain.



A model of Japan's new research ship Shirase which was launched on December 11. She cost $NZ126 million.

Voyage to Adelie Land deferred

Three French mountaineers, who were the first to sail a yacht from New Zealand to Antarctica in the 1978-79 season, have deferred their plans to make a voyage from Australia to Adelie Land this summer. The reason? Claudine Lescure, wife of Jean Lescure, became pregnant in the Antarctic earlier this year, and their yacht, Isatis II, had to be sailed to Port Stanley, Falkland Islands (Islas Malvinas) where better facilities for the birth were available.

In the 1978-79 season Jean Lescure, Claudine, and her brother, Jean-Marie Pare, left Lyttelton on December 3, 1978, to sail their 10m aluminium yacht Isatis to Palmer Station where they arrived on January 15, 1979. They visited several bases in the Antarctica Peninsula area, and climbed mountains on the mainland before sailing on to Chile.

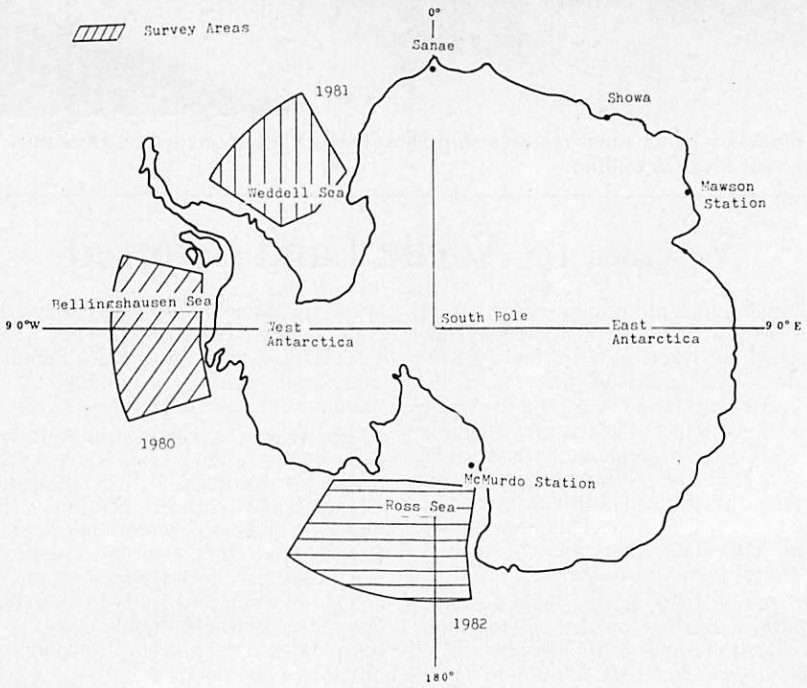
Last season trio arrived in Antarctica again sailing a new yacht, Isatis II. They called at Faraday in the Argentine Islands, and Palmer Station. Their intention was to winter at Adelaide Island, and then sail to Australia. But Claudine's pregnancy forced a change of plan, and Isatis II headed for Port Stanley where the child was to be born. So far,"Antarctic" has not been advised of the happy event.

Japanese oil survey in Weddell Sea

A survey for geological indications of oil in the Weddell Sea will be made this season by the Japanese Metal Mining Agency's geological survey ship Hakurei Maru. The survey of an area between 60deg and 74deg S and 0deg to 70deg W is being carried out by the Japan National Oil Corporation for the National Agency of Natural Resources and Energy. A similar survey was made last season in the Bellingshausen Sea between 60deg S and 100deg to 75deg W, and the final survey of a three-year programme will be made in the Ross Sea in the 1982-83 season.

With a crew of 35 and 17 scientists from the National Oil Corporation and research institutions the Hakurei Maru sailed from Funabashi near Tokyo on November 24. She is expected to arrive in Valparaiso on December 22 and sail again for the Weddell Sea on December 26, arriving in the area on January 5. On January 31 she will depart for Valparaiso. After three days there she will leave on February 12 for Funabashi where she is expected to arrive on March 13.

Leader of the research staff aboard the Hakurei Maru is a geophysicist, Mr Takashi Yamazaki, who is the chief scientist. Principal members of the scientific staff are Dr Tomoyuki Moritani, a geologist and co-chief scientist, Dr Shunji Sato and Mr Yoshihisa Okuda (geochemist) and Mr Takao Saki (geophysicist). Dr Sato, of the National



Oil Corporation's technology research centre, took part in the Bellingshausen Sea survey.

This season the research team will conduct seismic refraction and sono-radio buoy refraction surveys in the Weddell Sea. They will also take core samples from the seabed, measure terrestrial heat flows, and carry out magnetometer and gravimeter surveys.

Last season the Hakurei Maru conducted the Bellingshausen Sea survey in two stages, and core samples were taken from four holes drilled in the seabed. In 47 days she covered a distance of 9713 nautical miles.

Dr Yasafumi Ishiwada, of the National Oil Corporation was the chief geologist last season, and in charge of the research team. The chief scientist for th esecond leg of the survey was Mr Tadashi Asakawa, manager of the geology and geochemistry laboratory of the National Oil Corporation's technology research centre.

When the Hakurei Maru called at Wellington Dr Ishiwada said that the report on the Bellingshausen Sea survey would go to the Ministry of International Trade and Industry, which had provided 530 million yen for one of its divisions, the Agency for Natural Resources and Energy. Results of the survey would be published, and data could be made available to other countries on a reciprocal basis.

China's plans for permanent research station

China's future plans for Antarctic research include the establishment of a permanent scientific station on the continent as soon as possible, according to the official Chinese news agency, Xinhua. An agency report in October quoted Mr Guo Kun, deputy-director of the National Antarctic Research Committee as saying that China is planning an expedition to Antarctica.

Although the People's Republic of China has not acceded to the Antarctic Treaty, it has been interested in Antarctic affairs since 1977. It has been in touch with Australia, New Zealand, Japan, Chile, and France, and has had observers at recent international meetings dealing with Antarctica. Two observers attended the 16th meeting of the Scientific Committee on Antartic Research in New Zealand last year.

In the 1979-80 season a geomorphologist and an oceanographer from the People's Republic of China spent three weeks at the Australian station, Casey. They also visited McMurdo Station and Scott Base.

Last season an oceanographer and a geomorphologist did summer research at Casey as guest scientists with the Australian research programme. The geomorpholgist, Mr Zhang Quing Song, who also visited Casey in the 1979-80 season, then wintered this year with the Australians at Casey. Another oceanographer worked aboard the Nella Dan on the Australian section of the First International BIOMASS Experiment (FIBEX).

This season two guest scientists form the People's Republic of China will take part in the New Zealand research programme. A microbiologist and a geochemist will work with New Zealand scientists mainly in the dry valleys of the McMurdo Oasis in Vistoria Land.

SAE-27

Weddell Sea pack ice expedition

Soviet and United States scientists last month completed an unusual joint expedition in the Southern Ocean to find and explore a large and mysterious "lake" of ice-free water discovered by satellite observations in the Weddell Sea pack ice. Their oceanographic expedition aboard the Mikhail Somov, flagship of the Soviet Antarctic fleet, was the first scientific journey into the pack near the time of its maximum extent since the German expedition led by Wilhelm Filchner was trapped there aboard the Deutschland in 1912.

Early in October the Mikhail Somov left Montevideo for the Weddell Sea. She entered the pack ice near the Greenwich Meridian in search of the Weddell Polynya where the winter sea ice cover is often incomplete, perhaps absent, in an area about 3km by 10km. Late in November the ship returned to Montevideo to put American scientists and their equipment ashore. She then began her normal research and supply activities with the 27th Soviet Antarctic Expedition.

In 1973 satellite images revealed the existence of the polynya (Russian for unfrozen water surrounded by ice) near the Greenwich Meridian and 65deg S. The polynya appeared and disappeared mysteriously in subsequent winters. It grew to nearly 300,000 square kilometres, and drifted westward before vanishing in the late 1970s. A satellite photograph of sea ice near the Antaractic Peninsula taken in February, 1979, however, showed a polynya in about 65 deg S/50deg W.

SOVIET TEAM

Co-directors of the Weddell Polynya expedition were Dr Eduard Sarukhanyan, who headed a team of 25 Soviet scientists, and Dr Arnold L. Gordon, professor of geological sciences at the Lamont-Doherty Geological Observatory, Columbia University. The American team included nine scientists from Columbia University, and four from Oregon State University and the United States Army Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire. One of the Columbia University scientists, David Woodroffe, is a New Zealander.

Arrangements for the joint expedition were made after a meeting of Soviet and United States scientists in Leningrad earlier this year discussed results of joint research in the Southern Ocean between 1975 and 1981, and the programme for further co-operation. American participation in the expedition was financed by the National Science Foundation's divisions of polar programmes and ocean sciences, and Dr Gordon coordinated the programme with the Soviet Arctic and Antarctic Research Institute in Leningrad.

Satellite observations towards the end of the southern winter did not disclose a polynya, but a slight decrease in ice concentration was inferred from satellite images near 66deg S/5deg E. Scientists hoped that by October this weakening of the ice cover would develop into a polynya. If no polynya appeared the expedition planned to study environmental conditions within the ice pack, which has never been done before near the period of maximum extent of the pack.

ICE STRUCTURE

During the expedition scientists planned to study the thickness of the snow cover and the structure of the ice, and investigate how the ocean is giving up

heat to the atmosphere, and is stratified according to temperature, salinity, and density. Other projects included examination of the chemistry and biology of the region, not only in the polynya, but also in the surrounding ice.

Since the polynya was first sighted scientists have been puzzled by its abrupt appearance and disappearance. Dr Gordon says there are two explanations. One is that a strong wind blows the ice away before a significant amount can accumulate. The other is that for some reason enhanced convection is going on in the region. But basically the scientists believe the polynya is caused by upwelling of ocean heat rather than the removal of ice by high winds.

To oceanographers and climatologists the Weddell Polynya is important because it represents an increase in the vigorous up and down movement of the Antarctic seas. Rising warm water displaced colder water which sinks and is distributed throughout the world's oceans. Because of the heat loss through the polynya there is a major cooling of the abyssal ocean going on. This is important from a climatic point of view as much of the waters below 1000m in the world's oceans are derived from the Antarctic.

Ice in the Weddell Sea has been studied by Soviet oceanographers early this season. During the past winter glaciologists at Vostok, far in the interior of Antarctica, have been drilling deep into the polar ice-cap.

DEEP DRILLING

Four years ago the deep drilling programme at Vostok, which includes a microbiological research project, had reached a depth of 1000m. This year drilling has penetrated the ice to a depth of more than 1500m. It is reported to be the first time such a depth of more than 1500m. It is reported to be the first time such a depth has been achieved by thermal drilling.

Drilling at Vostok through ice thousands of years old and almost four kilometres thick, is one of the most challenging scientific projects in Antarctica. The drillers have had to work during the winter darkness in temperatures as low as minus 60deg Celsius, and in a rarefield atmosphere at an altitude of nearly 3500m.

So far glaciologists have studied ice cores taken from a depth of less than one kilometre and about 50,000 years old. One core about 15,000 years old has shown that a notable thaw occurred in Antarctica at that time.

Microbiologists have detected in ice samples bacteria believed to have been brought into Antarctica by cosmic particles. They have frozen in the ice for thousands of years, but some species of micro-organisms have been revived.

LIFE IN ICE

Earlier studies by scientists at the Institute of Microbiology have shown that life existed within the Antarctic ice-cap as well as in the sea. The simplest of micro-organisms, about 8000 years old, have been found in Vostok ice cores from a depth of 200m, and have been brought back to life.

A second seasonal station Druzhnaya II, was opened at the base of the Antarctic Peninsula for the first time by the 26th Soviet Antarctic Expedition last season. Druzhnaya II, on the Ronne Ice Shelf near the Lassiter Coast (about 75deg S) was established by the Kapitan Markov, out of Leningrad.

In addition to this operation the Kapitan Markov also established Druzhnaya I on the Filchner Ice Shelf. It has been used each season as a summer field station since 1975-76. The Druzhnaya operations were assisted by the cargo ship Pioner Onegi, out of Archangel, which carried four aircraft (AN-2s and IL-14s) for use by the field parties.

FIRST SHIP

First of the ships of SAE-26 to reach Antarctica was the passenger ship Bashkiriya, out of Odessa. She supplied Bellingshausen Station on King George Island in the South Shetlands, and then transferred staff to the research ship Professor Zubov and to the Kapitan Markov. Then, in company with the Mikhail Somov she called at Molodezhnaya and Mirny before heading home in February.

On her sixth Antarctic cruise the Mikhail Somov resupplied Molodezhnaya and Mirny. Staff and supplies were transported by helicopter from the ice edge to the stations. Early in February the ship resupplied Russkaya at Cape Burks on the stations. Early in February the ship resupplied Russkaya at Cape Burks on the Hobbs Coast. A new winter team led by L. V. Bulatov replaced Vladimir M. Stepanov's team.

Three other ships took part in the expedition. They were the Estoniya, out of Riga, which delivered 1981 winter teams to several stations; the research ship Professor Vize; and the tanker BAM, out of Batum, which delivered diesel and other fuels to the Soviet stations.

Chilean summer research programme

Twenty-four scientists, including three from West Germany, will take part in the Chilean Antarctic Institute's research programme this season. They will work on islands in the South Shetlands and off the Antarctic Penisula, and at the three permanent bases, Arturo Prat, Bernardo O'Higgins, and Rodolfo Marsh.

To transport scientists and base staff Chile will use two ships, and six aircraft — one Twin Otter, four de Havilland Buffaloes, one Hercules, and two naval helicopters. The 2785-tonne ice-strengthened transport Piloto Pardo, which carries two Bell Jetranger helicopters, will leave Punta Arenas on December 10 and return on January 14. She will be followed on January 4 by the 240-tonne motor vessel Quellon, which will be back in Punta Arenas on February 28.

After the summer programme ends 55 men will remain at the permanent bases for the 1982 winter. There will be 20 at Bernardo O'Higgins on the Trinity Peninsula at the extreme north-east end of the Antarctic Peninsula, 11 at Arturo Prat on Greenwich Island in the South Shetlands, and 24 at Rodolfo Marsh (62deg 12min S/58deg 55min W) which is also in the South Shetlands on King George Island. A summer station, Gabriel Gonzalez Videla in Paradise Bay on the Danco Coast, the sub-base, Yelcho, on Doumer Island in the Palmer Archipelago, and a refuge at Punta Spring on the Antarctic Peninsula, will also be used this season.

Teniente Rodolfo Marsh is Chile's new Antarctic air base. It is close to Presidente Frei, the meteorological centre for the Antarctic Peninsula, which was established in 1969. Rodolfo Marsh has a 1200m runway of compacted gravel and permafrost which was completed in the 1979-80 season.

Early last year the runway,then only 915m long, was used successfully for air operations by Twin Otter and Hercules wheeled aircraft. Since then the runway has been extended to 1200m. The airfield can accommodate two Hercules aircraft, and there is hangar space for one Buffalo and two helicopters. There is accommodation for up to 52 people.

Three West German scientists from the University of Hanover will take part in geodetic studies at Punta Spring and on Anvers Island. A glaciological project will also be carried out at these locations.

Other projects include regional geology, studies of the ecology of fishes, benthic and plant communities, seismology and the ionosphere, and oceanography. Four scientists will study marine mammals on Livingston Island in the South Shetlands.

GANOVEX 81

Second Victoria Land expedition

West Germany's second expedition to Northern Victoria Land — the first was in the 1979-80 season — will spend nearly three months in the area on geological and geophysical surveys. Field parties will be supported by five Canadian Hughes 500 helicopters, and an ice-strengthened ship will be used as a floating base off the Pennell Coast of Oates Land.

GANOVEX 81 has been planned by the Federal Institute of Geosciences and Resources (BRG) and is led again by Dr Franz Tessensohn. The expedition's chartered ship is the 2158-tonne Gotland II, one of three ships used last season in the establishment of Georg von Neumayer Station, the first permanent West German research station in Atka Bay, Queen Maud Land. The master is Captain Ewald Brune.

To support 12 geologists and geophysicists the BRG has chartered the five Hughes 500 helicopters from Liftair, Calgary. In addition to four Canadian pilots and two engineers there are three New Zealand field guides. The leader is Gary Ball, who took part in GANOVEX 79, and with him are Maurice Conway, who also worked with the first expedition, and Andrew Brown, who was in the snowcraft and survival team at Scott Base last season.

One of three guest scientists in the expedition, which has a total staff of 25, is Tim Stern, Geophysics Division, Department of Scientific and Industrial Research. The others are an American geologist, Dr Tom Wright, of Allegheny College, and Dr Chris Wilson, of the University of Melbourne, who has worked with ANARE in Enderby Land. Dr Wright, who was with GANOVEX 79, will not travel by ship. He will be flown to the GANOVEX 81 base camp from the base camp of the United States-New Zealand-Australia expedition in the Evens Neve area.

Before the Gotland II, which has a crew of 17, sailed from Wellington on November 14, members of the field parties, half of whom were with Ganovex 79, spent nine days in the Mt Cook area where they took part in a snowcraft and survival course. The course was arranged by Gary Ball, who is a highly-experienced mountaineer and alpine guide. He was field leader of the snowcraft and survival course at Scott Base in the 1976-77 season.

Provided ice conditions are suitable the Gotland II will remain most of the time in Yule Bay off the Pennell Coast of Oates Land. In the summer there is a sheltered ice-free anchorage there, and there are no katabatic winds. This anchorage was used by the GANOVEX 79 supply ship Schepelsturm for part of the season.

In 1979 the first expedition established its base camp at the foot of the Lillie Glacier near Mt Mulach in the Posey Range. It erected a prefabricated hut about 6m by 3.6m, which was christened Lili Marlene.

If the hut has not been damaged it will be used for the base camp again. Fuel, supplies, and equipment will be transported from the Gotland II in Yule Bay across the Anare Mountains to base camp.

Helicopter support will enable field parties to work within a radius of 200km from base camp. A geophysical party will make a survey of the Rennick Glacier, and the main area for the geological party will be the Lanterman Range. As the West German scientific programme is planned to tie in with the

United States-New Zealand-Australia expedition the geologists will also spend some time in the northern Bowers Mountains where a New Zealand sledge party led by Dr Malcolm Laird, of the Geological Survey, is at work.

Present plans are for GANOVEX 81 to end its surveys by the beginning of March next year, when the Gotland II will move out of Yule Bay. Field parties are expected to return to the ship by the end of February.

West Germany plans two bases this season

West Germany will have two research stations operating in Antarctica this summer. They will be the permanent station, Georg von Neumayer (60deg 37min S/8deg 22minW) on the Ekstrom Ice Shelf in Atka Bay, and another on the Ronne Ice Shelf.

Five men who have wintered at the permanent station will be relieved this month when the summer research team arrives. The relief expedition will also re-open an unoccupied station on the site originally planned for the permanent station if the weather permits.

This season's programme began on November 21-22 when the chartered motor-ship Polar Queen sailed from Bremerhaven. Her cargo included large stocks of food, and building materials for the station and the geophysical observatory located in the annex to it.

Glaciology will be the main project in this summer's programme, which will be supported by two helicopters. Holes up to 100m deep will be drilled in the Ekstrom and Filchner Ice Shelves.

When the Polar Queen leaves Atka Bay seven men will remain behind to operate the Georg von Neumayer Station next winter. They are a doctor, two meteorologists, a geophysicist, an engineer, a radio operator, and a chef.

Ice conditions in the Weddell Sea last season prevented the West German expedition from reaching the Gould Bay area where the permanent station was to be established about 20km inland on Ronne Ice Shelf west of Berkner Island near 77deg 68min S/50min W. This area is regarded as more suitable for glaciological research.

In the 1979-80 season the reconnaissance expedition sent south to select possible sites for the permanent station established a small base on the Ronne Ice Shelf where scientists carried out glaciological investigations and related studies.

Norwegian plans for season

A programme of iceberg research started by the 1978-79 Norwegian Antarctic Research Expedition will be continued this summer. The research will be conducted by one scientist in the northern Weddell Sea from H.M.S. Endurance, the Royal Navy's ice patrol ship.

Norwegian research activities are limited again this season. No winter station will be manned next year. During the summer one biologist will conduct entomological research on South Georgia in co-operation with the British Antarctic Survey.

Last season two scientists from the Norwegian Polar Institute worked with the Scott Polar Research Institute on a joint iceberg research project in the Scotia Sea from H.M.S. Endurance. One biologist took part in the First International Biological Experiment (FIBEX) aboard the United States research ship Melville.

ANTARCTIC TREATY

Mineral resources and exploitation

Measures to hasten the establishment of an agreed regime to regulate the orderly exploration and exploitation of Antarctica's mineral resources, and to preserve the continent's unique environment, were agreed to by the 11th consultative meeting of representatives of the Antarctic Treaty nations held in Buenos Aires from June 23 to July 7. The representatives recommended to their governments that conclusion of a regime is a matter of urgency, and a special consultative meeting should be held to elaborate it.

New Zealand will be the host country for the first session of the special consultative meeting. Representatives of the other member nations accepted the New Zealand Government's invitation to hold the meeting in Wellington towards the middle of next year. Canberra, where the first Antarctic Treaty Consultative Meeting (ACTM) was held in 1961, will be the venue for the 12th ATCM in 1983.

Fourteen nations were represented at the Buenos Aires meeting. They were the 12 original signatories of the Antarctic Treaty — Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, Soviet Union, United Kingdom, and United States — and Poland and West Germany. New Zealand's delegation was led by Mr C. D. Beeby, Assistant Secretary of Foreign Affairs. With him were Messrs R. B. Thomson, Superintendent, Antarctic Division, Department of Scientific and Industrial Research, J. D. L. Richards, head of the South Pacific and Antarctic Division, MFA, and C. R. Keating, First Secretary, New Zealand Embassy, Washington.

FIVE PRINCIPLES

Five principles on which the proposed regime should be based were detailed in the 10 recommendations covering mineral resources which were agreed to by the representatives. They are:

(a) The consultative parties should continue to play an active and responsible role in dealing with the question of Antarctic mineral resources.

(b) The Antarctic Treaty must be maintained in its entirety.

(c) Protection of the unique Antarctic environment and of its dependent ecosystems should be a basic consideration.

(d) The consultative parties, in dealing with the question of mineral resources should not prejudice the interests of all mankind in Antarctica.

(e) The provisions of Article IV of the Antarctic Treaty should not be affected by the regime. It should ensure that the principles embodied in Article IV are safeguarded in application to the area covered by the Antarctic Treaty.

Article IV refers to territorial sovereignty in Antarctica and the previously asserted rights or claims by contracting parties. There is a ban on asserting new claims or enlarging existing claims while the present treaty is in force, and no activities or acts that take place can constitute a basis for asserting, supporting or denying a claim to ter-

ritorial sovereignty or create any rights of sovereignty.

PREVIOUS CLAIMS

Rights or claims are recognised in the sixth recommendation. It says that any agreement that may be reached on a regime for mineral exploration and exploitation in Antarctica elaborated by the consultative parties should be acceptable and be without prejudice to those States which have previously asserted rights or claims to territorial sovereignty. This proviso also covers those States which neither recognise such rights of or claims to territorial sovereignty nor, under the provisions of the Antarctic Treaty, assert such rights or claims.

Seven nations have made formal claims to sovereignty in Antarctica. They are Argentina, Australia, Chile, France, New Zealand, Norway, and the United Kingdom. The other consultative parties either do not formally recognise any claims or do not make any.

Any regime, according to the seventh recommendation, should include means for assessing the possible impact of mineral resource activities on the Antartic environment in order to provide for informed decision-making, and to determine whether these activities will be acceptable. There should also be means for governing ecological, technological, political, legal, and economic aspects of such activities in cases where they would be determined as acceptable. These should include, as an important part of the regime, the establishment of rules relating to the protection of the environment, and the requirement that mineral resource activities undertaken within the regime should comply with the rules.

Procedures for adherence by States other than the consultative parties either through the Antarctic Treaty or otherwise should also be included in the regime. They should ensure that an adhering State is bound by the basic provisions of the Antarctic Treaty, in particular Articles I, IV and VI, and by the relevant recommendations adopted by the consultative parties. Entities of that State should be eligible to participate in mineral resource activities under the regime. There should also be provisions for co-operative arrangements between the regime and other relevant international organisations.

Article I says that Antarctica shall be used for peaceful purposes only, and prohibits any military measures. Article IV retains the legal status quo in respect to previously asserted rights or claims, and bans new claims or enlargements of existing claims while the treaty is in force. Article VI applies the provisions of the treaty to the area south of 60 deg, but does not prejudice or affect the rights of any State under international law with regard to the high seas in that area.

DEEP SEABED

An agreed regime should apply to all mineral resource activities on the Antarctic Continent and it adjacent offshore areas but without encroachment on the deep seabed. The precise limits of the area of application would be determined in the elaboration of the regime. The regime should include provisions to ensure that the special responsibilities of the consultative partices in respect of the environment of the Antarctic Treaty area are protected, taking into account responsibility which may be exercised in the area by other international organisations.

In its scope the regime should cover exploration (activities relating to minerals, involving, in general, retention of proprietary data and/or non-scientific exploratory drilling) and exploitation (commercial development and production). The regime should promote the conduct of research necessary to make the environmental and resource management decisions which would be required.

To improve predicitions of the environmental impacts of activities, events, and technologies associated with mineral resource exploration and exploitation if they occur, the representatives recommended that the contracting parties should continue, with the assistance of the Scientific Committee on Antarctic Research, to define programmes with certain objectives. These should be to retrieve and analyse relative

information from past observations and research programmes, ensure that effective use is made of existing programmes, and identify and develop new programmes that should have priority because of time needed for results to become available.

NO EXPLOITATION

In its final recommendation the meeting proposed that in elaborating the regime at the special consultative meeting the representatives should take account of the recommendation on Antarctic mineral resources adopted at the ninth ACTM. In this governments were asked "to urge their nationals and other States to refrain from all exploration and exploitation of mineral resources while making progress toward the timely adoption of an agreed regime concerning mineral resource activities. They will thus endeavour to ensure that, pending the timely adoption of agreed solutions pertaining to exploration and exploitation of mineral resources no activity shall be conducted to exploit such resources."

Although the agenda for the Burenos Aires meeting listed an extensive range of issues for discussion in addition to mineral resources, the problems of agreeing on a regime to cover mineral exploration and exploitation dominated proceedings. Substantive issues that were raised, however, included a range of technical questions (meteorological data, telecommunications, oil contamination etc.) and a series relating to the future operation of the whole Antarctic Treaty system.

Oil contamination of the Antarctic marine environment was considered by the meeting, and particularly the second part of the recommendation on the reduction of the risk of contamination, which was agreed to at the 1979 meeting in Washington. There was an exchange of views concerning applicable existing international conventions for prevention of oil pollution of the sea, and remedial measures which might be taken in the event of a major oil spill in Antarctica.

The following conclusions were drawn:

(a) In view of the nature of present ship operations in the Treaty area, the application of provisions contained in existing international conventions for prevention of oil pollution of the sea provide for the time being an adequate and sufficient basis for minimising risks of pollution.

(b) Ship operations, especially those of tankers, always create some risk of pollution and this question should remain under continuing review by the consultative parties to ensue the adoption of the most appropriate preventive measures.

(c) Prevention of pollution of Antarctic waters by oil, and the best remedial measures if oil spills should occur, would be facilitated by future studies in the Antarctic, and by the results of studies and experience available fom elsewhere.

(d) The setting up of protective walls around pil storage tanks where practical was appropriate for some areas on a voluntary basis.

After consideration of the first part of the 1979 recommendation the representatives agreed that the Scientific Committee on Antarctic Research should be encouraged through its appropriate working groups and groups of specialists to develop guidelines for a programe of baseline measurements of hydrocarbon content in the Antarctic marine ecosystem. Operating techniques and other pertinent techniques will be considered at a SCAR logistics symposium in Leningrad next year.

TRANSGLOBE EXPEDITION

Ice team ends voyage in North-west Passage

Aided by the best year for ice in the North-west Passage since 1963 the British Transglobe Expedition has made good progress on the last stage of its planned circumnavigation of the world, using the Greenwich meridian as a basic route. The leader, Sir Ranulph Fiennes and Charles Burton were reported by the end of September to have reached Alert at the northern tip of Ellesmere Island, which is the starting point for the attempt to cross the Arctic Ocean to Spitsbergen by way of the North Pole next year.

Alert (82deg 31min N/62deg 05min W) is a Canadian military and research station less than 900km from the North Pole. Fiennes and Burton will winter there, and Lady Virginia Fiennes will remain with them to handle communications after the support team has returned to Britain.

To prepare for the crossing of the Arctic Ocean, planned to begin in February next year, fuel has been transported by air to Alert and Nord, a Danish weather station in north-west Greenland at 81deg 43min N/17deg 50min W. The drums of fuel have been flown by a chartered Hercules aircraft from the United States Air Force base at Thule (76deg 32min N/68deg 50min W), and the operation was expected to be completed at the end of October.

By the middle of August Fiennes and Burton were at Spence Bay, a Distant Early Warning Line station on the Boothia Peninsula. From there they took their 5.4m Boston whaler through Bellot Strait into Prince Regent Inlet where they had to wait three days for proper conditions to get from the end of Somerset Island (73deg 30min N/93deg 30min W) into Resolute Bay.

On the next stage the route was down Lancaster Sound, east around Devon Island (75deg N/86deg W), west to the weather station in Grise Fiord, then west and north through a passage known as Hell's Gate between Devon Island and Ellesmere Island, into Norwegian Bay.

From there the course was north again to Eureka, another Ellesmere Land weather and research station at 79deg 59min N/85deg 57min W. By this time ice had started to form in the final section of the North-West Passage. To avoid being trapped and locked to a floe Fiennes called up the expedition's Twin Otter aircraft which guided the whaleboat through the confused ice.

By early September the expedition was established at an abandoned weather camp in Tanquary Fiord (81 deg 25min N/76deg 55min W) on Ellesmere Island, 835km from the North Pole. At the beginning of the second week the team planned to begin the final stage of 240km by land to Alert.

TOURISM

Ships will make six cruises to Antarctica

More than 900 tourists are expected to visit Antarctica and sub-Antarctic islands by ship this season. The Lindblad Explorer will make two voyages from New Zealand, and the World Discoverer will end one of its four voyages at a New Zealand port.

Society Expeditions, of Seattle, has planned four cruises by the World Discoverer between November 19 and February 18 next year. About 190 passengers will be carried on each trip. The first will start from Rio de Janeiro and end at Punta Arenas, Chile. Cruises 2 and 3 will begin at Punta Arenas, and the last cruise from the same port will end at Bluff.

On the first cruise, beginning on November 19 the World Discoverer will call at the Falkland Islands (Islas Malvinas) and then visit research stations on King George Island in the South Shetlands, the United States Palmer Station on Anvers Island, and Faraday, the British Antarctic Survey station in the Argentine Islands. Calls will also be made at Paradise Harbour, Port Lockroy, and Deception Island before the return to Punta Arenas on December 11.

Departing from Punta Arenas on the same day the World Discoverer's second cruise will take tourists first to the Falkland Islands, then to South Georgia and the South Orkney Islands. After that the cruise will follow the same route as the first. The ship will cruise in the Beagle Channel on the way back to Punta Arenas where it will arrive on December 31.

Between December 31 and January 20 the World Discoverer will cruise in the Antarctic under charter to Transoceanica Santiago de Chile. Then it will start the final cruise to New Zealand by way of the Antarctic Peninsula and the Ross Sea.

Leaving Punta Arenas on January 20 the World Discoverer will call at research stations in the Antarctic Peninsula area. Early in February she will cruise off Capes Crozier, Bird, and Royds. On the voyage north to Bluff from McMurdo Sound she will pass Coulman and Possession Islands. One day will be spent at Cape Adare where the tourists will go ashore. Then the World Discoverer will cruise past the Balleny Islands to Macquarie Island and the Auckland Islands. The cruise will end at Bluff on February 18.

When the Lindblad Explorer makes her two voyages to Antarctica from New Zealand she will carry about 90 tourists on each trip. On the first trip the ship will leave Bluff on December 13 and return on January 5. She will sail again the same day on the second voyage and arrive back in Lyttelton on January 29.

Both voyages will take the tourists first to the Snares and Auckland Islands. Beyong 60deg South the ship will cruise by the Balleny Islands, and then make its Antarctic landfall off Cape Adare. Visits will be made to McMurdo Station and Scott Base, and in McMurdo Sound the ship will cruise past Cape Royds and Cape Evans.

Passengers on the first voyage will spend Christmas Day at sea off the Ross Ice Shelf. On the way north to Bluff, and also to Lyttelton, the Lindblad Explorer will call at Macquarie Island, Campbell Island, and Stewart Island.

An Argentine Navy transport will make three tourist cruises to Antartica next month for Antartur Maritime Cruises. The Bahia Buen Suceso, which was used on similar cruises in the 1977-78 season, will visit bases and scientific stations on the Antarctic Peninsula and in the South Shetlands.

ANTARCTIC BOOKSHELF

The New Explorers. Women in Antartica

By
Barbara Land

Dodd, Mead and Co., New York, 1981. 224pp, 82 black and white photographs, drawings and map. $US 8.95.

On Febraury 20, 1935, Caroline Mikkelsen, wife of a Norwegian whaling captain, became the first woman to step ashore on the Antarctic mainland, 114 years after the first men had done so. By 1969, man had set foot on the moon, but only a handful of women, mostly tourists, had gazed upon even the periphery of the southern continent.

It was not for want of trying that women were excluded. Since the IGY, scientists had flocked to the Antarctic. Women scientists had applied to go, but between them and their goal sat the tradition-bound bureaucracy of the United States Navy, the arbiter of logistic support for most scientific work. In 1969, the Navy relented, and, in little more than a decade, women have become active, and commonplace, participants in Antarctic research and station life.

From extensive interviews, Barbara Land has written an entertaining account of these "New Explorers", primarily scientists — the backgrounds which led them to polar research, their scientific projects, and their experiences in the Antarctic.

Among the first groups of women to travel south were scientists who had already earned solid credentials in Antarctic research, working on projects for years without hope of reaching the continent. Dr. Lois Jones had completed a doctoral dissertation on the geochemistry of the dry valleys of Southern Victoria Land, using samples brought back by male colleagues. Dr Mary Alice McWhinnie, an authority on krill, tiny, shrimp-like creatures that are vital link in the Antarctic food chain, had sailed Antarctic waters aboard the research ship Eltanin for ten years before being allowed to work from a land base, as station scientific leader at McMurdo Station, and then Palmer Station.

Other women were new to Antarctic research; beginning as field assistants to other scientists, they have gone on to earn degrees and carry out their own research programmes. Far from finding the Antarctic forbidding or overwhelming, most of these women have returned year after year, and some are now veterans of five or six field seasons.

Their scientific undertakings are as valid as the opportunities for research afforded by such a vast and unique land. Women biologists have studied the behaviour of penguins, tracked, and recorded the calls of seals and killer whales, analysed the unique biochemistry of fjsh that survive in subzero waters, and even discovered algae that grow inside rocks.

Eileen McSaveney was one of the first women to work with the United States Antarctic research programme during the 1969-70 season. Then a graduate student in geology she was a member of a team of women from Ohio State University led by Dr Lois Jones, which worked in the Wright Valley for 10 weeks.

Women geologists have roamed the dry valleys, sampling the unusual chemistry of their rocks, soil and waters, collected and analysed fossil pollen to determine the beginning of Antarctica's isolation from the other continents, collected meteorites, mapped the geology of remote nunataks and mountain massifs, and sampled material from within the crater of an all-too-active Mt Erebus. Women have carried out projects in radiation physics, medical epedemiology, atmospheric physics, electrical engineering and psychology.

The women who have ventured south

into a previously all-male domain have encountered few difficulties. Their most common problems have been those familiar to all who have worked in polar regions — the frustrations of fickle weather, clumsy protective clothing, and equipment malfunctions in a place where the nearest spare parts may be thousands of kilometres away.

Barbara Land's book is written in a simple and readable style, for a younger audience. Her experience in journalism and science writing are evident — the descriptions of scientific projects are clear and accurate, and she manages a balanced blend of information and anecdote. Her book neither contains, nor has need of, feminist polemics; the spirit of adventure of the women she has interviewed should serve to inspire a new generation of women.

EILEEN R. McSAVENEY
Christchurch, New Zealand

OBITUARIES

Morton Moyes served twice with Mawson

Captain Morton Henry Moyes, O.B.E., one of the last two survivors of Sir Douglas Mawson's Australasian Antarctic Expedition (AAE) of 1911-14, died in Sydney on September 20 at the age of 95. He took part in three Antarctic expeditions between 1911 and 1930, and was the last survivor of the eight men of the AAE Western Party led by Frank Wild who spent a year and a day at a base on the Shackleton Ice Shelf off Queen Mary Land.

Only one member of the AAE now survives. He is a New Zealander, Mr Eric Webb, now living in England, who was 92 last month. Webb was the expedition's chief magnetician, and was a member of the main party based at Cape Denison. In 1977 he and Moyes, who were 2200km apart during the expedition, met again in Sydney.

Born in South Australia, Moyes was educated at St Peter's College, Adelaide, and the University of Adelaide where he gained a degree in mining engineering. He began his career as a science teacher at St Peter's College, and then transferred to Rockhampton, Queensland.

From Queensland Moyes was recruited by his geology lecturer, Mawson, as a meteorologist with the AAE. He spent 1912 as a member of the Western Base party which was landed on the Shackleton Ice Shelf from the Aurora, and took part in autumn and winter sledging journeys in Queen Mary Land.

When the main eastern sledge journey led by Frank Wild began on October 30 Moyes remained at the hut to continue meteorological observations. Wild agreed that C. T. Harrison should accompany the party to the depot 103km out, which Moyes had helped to lay, and then return alone. But the sledge left to make the depot had been carried away by the wind. Wild then decided to take Harrison on with the party because he could not afford to hand back the extra sledge Harrison had brought for the return journey.

ALONE IN HUT

As a result Moyes lived alone in the hut for nine weeks, keeping up the routine meteorological readings. After a

month he packed a sledge with food for Harrison, himself, and the dogs, and made a six days' journey in search of his comrade. When the eastern party returned on January 6, 1913, and he saw four men instead of three he stood on his head in the snow for sheer joy.

Moyes returned to Australia in 1913 and became a navigation instructor at the Royal Australian Naval College. In 1916 he went south again in the Aurora with the relief expedition to rescue the seven survivors of Shackleton's Ross Sea Party of the Imperial Trans-Antarctic Expedition, who were marooned on Ross Island.

As it was not known whether a search party would be required, Captain John King Davis, commander of the expedition, asked the Royal Australian Navy to second Moyes as navigator for any sledge journeys that might have to be made. Moyes was in Port Chalmers selecting material that might be needed when Shackleton arrived, and he shared a cabin with him during the voyage.

On the way south Moyes shared in the navigation duties aboard the Aurora. When the ship steamed into McMurdo Sound Shackleton, Moyes, and the New Zealand ship's surgeon, Dr F. G. Middleton, went ashore at Cape Royds where there seemed to be no sign of life. In Shackleton's hut they found a note which said that Ross Sea Party was at Cape Evans, 12.8km to the south.

MEN SIGHTED

Six men with a dog team and sledge were sighted on the sea ice as the Aurora approached Cape Evans. Shackleton, Moyes, and Dr Middleton, were quickly over the side and hastened across the soft snow covering the sea ice to meet the six men moving towards them. They were Professor A. O. Stevens, E. Joyce, H. E. Wild, J. L. Cope, R. W. Richards, and I. O. Gaze. The seventh survivor, A. K. Jack, had remained at the hut to complete some tide gauge observations. Later Gaze and Stevens, accompanied by Moyes and A. H. Ninnis, the ship's purser, set off to bring him back to the Aurora.

After the survivors were brought back to Wellington early in 1917 Moyes returned to his naval duties. In 1929 he went south a second time with Mawson. He was seconded at Mawson's request to the British, Australian, New Zealand Antarctic Research Expedition (BANZRE) and served as cartographer on the Discovery's first voyage in 1929-30. It was the third time he had sailed south with John King Davis, who was ship's captain and second-in-command of the expedition.

In 1946 Moyes retired from the Royal Australian Navy after 32 years' service. He was the first RAN officer to become an instructor captain, and was the first Director of Education in the service. From 1946 to 1951 he was Commonwealth Chief Rehabilitation Officer, directing a rehabilitation scheme for former servicemen and servicewomen.

On his retirement Moyes could look back on a notable career in the early days of Antarctic exploration — one of only nine men to have served in three or more expeditions of that period, and among the few who had been ashore on Ross Island, Adelie Land, Queen Mary Land, and Enderby Land. He was awarded the Polar Medal in silver for his service with the AAE, in bronze for the Ross Sea Party relief expedition, and a bar for his cartographic work on the first BANZARE voyage.

For many years Moyes subscribed to "Antarctic" as a result of his friendship with the first editor, L. B. Quartermain. In 1977 the New Zealand Antarctic Society invited him to attend the opening of the Canterbury Museum's new wing by the Duke of Edinburgh. He was not able to attend but sent a gift for the Antarctic centre — a book of nautical tables used in the navigation of the ships of four Antarctic expeditions which he had kept for more than 60 years.

Captain Davis was the original owner of the book which he used when he was chief officer in the Nimrod on Shackleton's 1908-09 expedition, and in the Aurora with Mawson's first expedition. On the Ross Sea Party relief expedition Moyes had to take sights daily because his nautical tables included information from 60deg North to 60deg South only. The captain's gift released Moyes from an onerous task, and he used the book

again in the Discovery on his BANZARE voyage.

In recognition of the part Moyes played in the mapping and exploration of what is now claimed as Australian Antarctic territory Mawson named three features for him. They are Cape Moyes (66deg 35min S/96deg 25min E), an ice-covered point fronting on the Shackleton Ice Shelf, Moyes Islands, a group of small islands at 67 deg 01min S/143deg 51min E, also discovered by the AAE, and Moyes Peak (67deg 45min S/61deg 13min E), a small rock peak 19.3km south-west of Falla Bluff, discovered by the BANZARE in 1931.

Quin Blackburn led first ascent of Scott Glacier

One of three men who made the first ascent of the Scott Glacier by dog team 47 years ago died in the United States early this year. Quin A. Blackburn was leader of the geological party of the second Byrd expedition (1933-35) which took its dog teams within 333km of the South Pole.

Blackburn was also a veteran of Byrd's first expedition (1928-30) in which he served as a topographer and dog driver. Another veteran of the expedition, the Welsh-born physicist, Dr Frank T. Davies, also died this year. There are now only seven survivors of the shore party, and eight who served in the expedition's two ships.

Byrd's geological party made the longest journey of the second expedition — 2269km across the Ross Ice Shelf to the Queen Maud Mountains, up and down the Scott Glacier, and back to Little America. Blackburn and his companions, Stuart L. Paine and Richard S. Russell, jnr., were in the field for nearly three months.

In December, 1934, the three men made the ascent of the 192km long Scott Glacier, then known as the Thorne Glacier. The journey to the rim of the Polar Plateau took them 10 days. Then they climbed Mt Weaver (2780m) at the head fo the Scott Glacier and only 333km from the Pole.

As its target Blackburn's party had a geological and paleontological reconnaissance of the unexplored easterly reaches of the Queen Maud Mountains. It discovered and mapped several hundred new mountains, and made fossil finds of prime importance at that time.

In moraines and gulleys around Mt Weaver at 86deg 58min S/153deg 50min W, and on the summit itself the party discovered fossils of plant leaves and stems, and even fossilised tree trunks up to 45cm in diameter. Blackburn counted 15 seams of coal in the sides of the mountain.

On the descent of the Scott Glacier at 86deg S and an altitude of 1524m the party found patches of lichens clinging to the northern faces of the rock — the farthest south life had ever been found 47 years ago. Safely off the glacier the party then travelled across the Ross Ice Shelf to Little America in record time — 848km in 16 sledging days.

Paine and Russell, who did the bulk of the dog driving to leave Blackburn free for his geological work, used the wind at their backs to help the dog teams. They made sails out of a torn tent, and bent them to ski poles, using bamboo trail stakes as booms.

Blackburn, who came from the State of Washington, spent 35 years in government service with the Bureau of Land Management, Department of the Interior. He retired to Boise, Idaho, where he died. His name was given to a massive, flat-topped mountain (3275m) at 86deg 17min S/147deg 16min W, and just east of the Scott Glacier, which he discovered.

Frank Davies, known to everyone at the first Little America, as "Taffy," was one of the best-liked men in Byrd's first expedition, and in the Antarctic he was also one of the busiest. With the help of

an assistant, Arnold H. Clark, he made magnetic amd auroral observations right through the winter of 1929 from May, and continued them until February the next year.

In addition to these duties "Taffy" Davies studied glaciological conditions with the second-in-command, Dr Laurence M. Gould. He also worked with Dr Francis D. Coman to record the cooling power of air under varying temperatures and wind velocities.

After he returned to the United States "Taffy" Davies had a distinguished scientific career in Canada. His geophysical research took him several times to the Arctic where he did extensive field work. He made his home in Ottawa where he died in September this year.

Argentine air service over part of Antarctica

Argentina's national airline, Aerolineas Argentinas, has established a regular air route to New Zealand over part of Antarctica and the Southern Ocean. The first scheduled flight of a monthly service was made to Auckland on September 5-6.

Eight years ago a feasibility study of a route from Argentina to Europe, Australia, and New Zealand, over the South Pole was made by an Argentine Air Force Hercules. The aircraft flew from Buenos Aires to Canberra and back, crossing Antarctica and refuelling at Christchurch and the Air Force base, Vice-comodoro Marambio, on Seymour Island off the Weddell Sea coast of the Antarctica Peninsula.

Two more flights over the same route were made by Hercules aircraft in December, 1974. Three years later the question of an Argengine air link with New Zealand was raised. Aerolineas Argentinas proposed a weekly service from Buenos Aires to Christchurch by way of Vice-comodoro Marambio in the summer, and direct in winter from Rio Gallegos in the south of Argentine Patagonia.

Since then there have been protracted negotiations between Argentina and New Zealand on the terms of a bilateral aviation agreement. Monthly charter flights began in April this year, followed by the first scheduled flight in September. This month and in January two flights will be made to meet traffic demands.

Last year Aerolineas Argentinas made two proving flights over the route, using its long-range Boeing 747-200B and a newly acquired Boeing 747SP. One flight coincided with a visit to Auckland by President Jorges Videla on his way home from South-East Asia.

Because of a fuel shortage at Auckland the Boeing 747SP had to make the second flight by way of Melbourne to Buenos Aires. The 11,700km flight took 12hrs 45min, and the aircraft flew over the Antarctic coastline for two hours.

Aerolineas Argentinas operates its new service with a Boeing 747-200B configures to carry 32 first-class and 310 economy-class passengers. The flight takes about 12hrs and the direct mileage distance between the two cities is 10,370km.

Although travel firms refer to the trans-polar service, the aircraft does not fly over the South Pole. Publicity maps show a route over Antarctica which follows the Antarctic Peninsula and then crosses Ellsworth and Marie Byrd Lands.

Antarctic Treaty

Three nations — Italy, Papua New Guinea, and Peru, signed the Antarctic Treaty this year. There are now 11 acceding parties, and 14 consultative parties, bringing the full membership to 25, not 26 as reported in "Antarctica," September, 1981.

South Korea was listed as an acceding party. Several years ago it indicated its wish to become an acceding party but did not pursue the matter.

ANTARCTIC

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