

ANTARCTIC

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



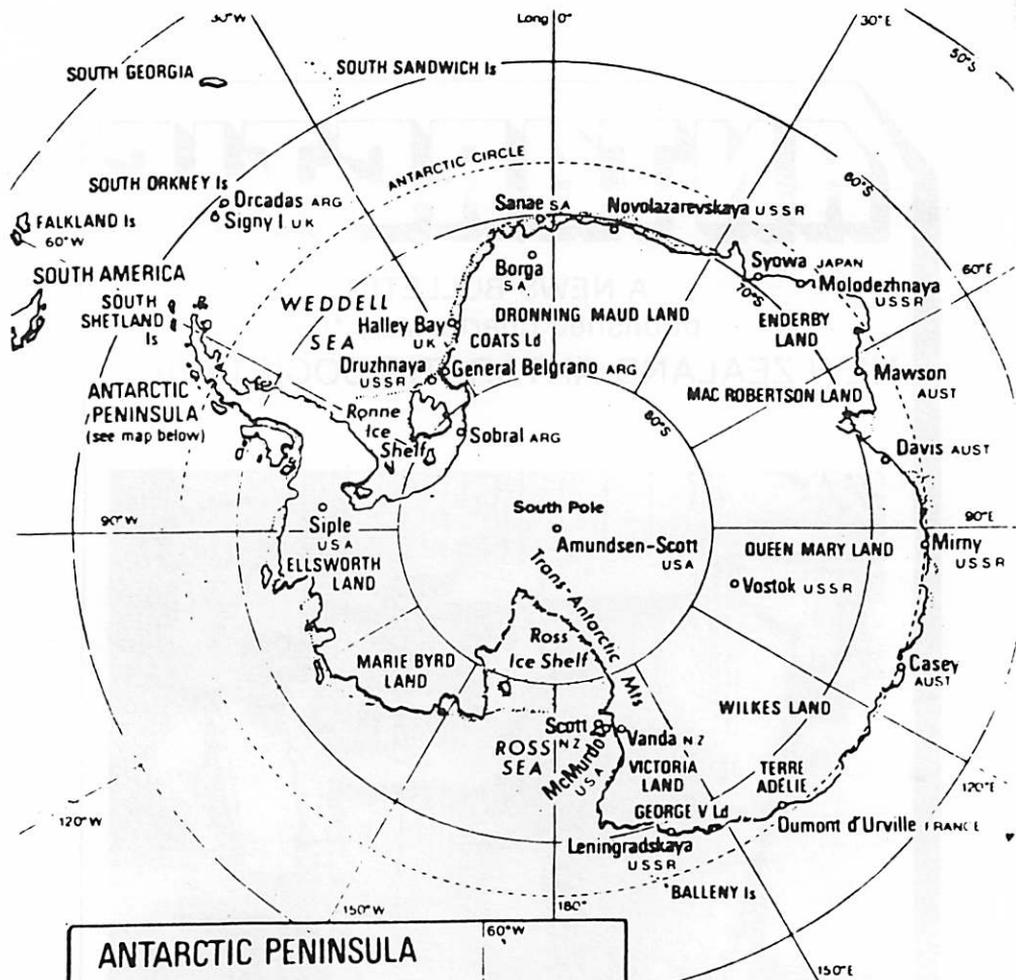
Mr R.B. (Bob) Thomson, (left), Director of New Zealand's Antarctic Division outside Sir Ernest Shackleton's hut at Cape Royd's. He was with Lord Edward Shackleton on his visit to the hut from which his father attempted to reach the South Pole some 77 years earlier.

— Photograph Antarctic Division.

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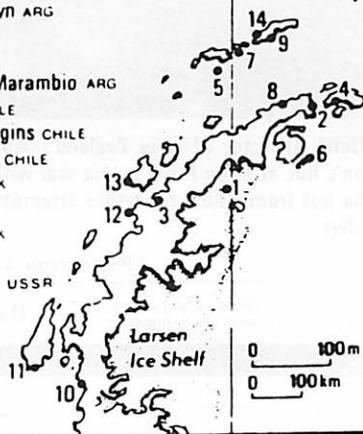
Registered at Post Office Headquarters,
Wellington, New Zealand, as a magazine.

December, 1985

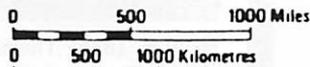


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- 1 Teniente Matienzo ARG
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- 7 Arturo Prat CHILE
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- 11 Adelaide I. UK
- 12 Argentine Is. UK
- 13 Palmer USA
- 14 Bellingshausen USSR



ANTARCTICA



ABBREVIATIONS

ARG ARGENTINA
AUST AUSTRALIA

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

ANTARCTIC

(successor to 'Antarctic News Bulletin')

Vol. 10, No. 12

120th Issue

December, 1985

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Address all contributions, inquiries to the editor

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ISSN 0003-5327

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New Zealand field work begins

Persistent bad weather bringing poor visibility to the McMurdo Sound area disrupted flights from Christchurch to Antarctica and delayed the start of some of the New Zealand and United States base programmes and field events. The season opened officially on October 1 but no aircraft were able to land until October 4. By October 17 only nine of the planned flights had reached McMurdo. The weather then improved.

Seven of the 11 man winter over team returned to Christchurch on October 7 after a year of isolation. The last of the party to leave was the doghandler Kevin Conaglen from New Plymouth. His handover trip to Cape Evans, Cape Roberts and the Blue Glacier with the dog team and new handler Richard Balm from Arthurs Pass was disrupted when they had to remain at Cape Evans for two days because of the weather. The early survival courses were either also postponed or curtailed because of the poor visibility at the training site.

The official handover of the base from the winter party to the summer staff occurred on Sunday October 6 at 4 p.m. when Peter Cresswell of Christchurch took over from winter leader and postmaster Leo Slattery. Peter Cresswell was officer-in-charge of Scott base last summer.

Early priorities for the season was the drilling of two boreholes in the Wright Valley as part of the U.S./N.Z. seismic programme and the surveying and preparation of the site for the construction of the new light workshop complex at Scott Base.

Supervision of the design and construction of the new building is the responsibility of Mr Allan

Richardson, a supervisor of works with the Ministry of Works and Development. Initial clearing of snow from the site was undertaken by A.P. Thomson of the Scott Base summer-staff and army construction team supervisors Sergeant Wayne Bryce, and Lieutenant Doug Gibbons.

Sergeant Bryce is an instructor at the Trade Training Troop School of Military Engineering at Linton Camp and Lieutenant Gibbons is a troop commander with Three Field Squadron at Burnham Camp. The site was resurveyed by Vince Belgrave (Wellington) and Phil Winters (Gisborne) who are also providing surveying assistance to a number of scientific projects.

Construction of the building, which is Stage V1 of the project and comprises the carpenter's shop, electrician and base engineer's workshop and machine shop, is the task of ten members of the 1 and 3 Field Squadrons of the Royal New Zealand Engineers. They began in mid-November and hope to have completed the shell, or exterior of the building by mid to late January. Another team will return to Scott Base at Winfly in August of 1986 to finish the interior. Equipment will be installed next summer.

Equipment for the season's drilling projects was transported in two trips by cargo train from Scott Base. Both were led by Garth Varcoe buildings and services officer with Antarctic Division.

The first trip of the season carried fuel and science equipment for the Waikato University, N.Z. Geological Survey project to obtain core samples from the floor of the Marshall Valley. The samples will be used to study the chronology of successive Ross Sea glaciations.

Equipment for the project left Scott Base on Saturday, October 12 for Cape Chocolate and was carried on two sledges hauled by a D5 caterpillar tractor. NZ1, the first of the new wannigans was carried on the third sledge. It is equipped with six foldaway bunks, table, chairs, storage space and a gas cooker and is carpeted. It was manufactured for Antarctic Division by Redpath Industries of Levin and delivered as part of the resupply cargo at the end of last season. A snow trac accompanied the tractor train.

Although Cape Chocolate is 50 km from Scott Base ice conditions caused a 10km detour and the trip was made in ten hours at about 10 km an hour in temperatures of -15 deg C. Visibility at times was very restricted. Accompanying Garth Varcoe were Linda Harrison, Scott Base information officer, Chuck Neels, radio operator and field assistant Peter Brailsford. All are from Christchurch.

Forty-five thousand pounds of drill equipment, fuel, drilling fluid and camp equipment were subsequently transported by cargo train from Scott Base to Marble Point in mid-October in preparation for the joint DSIR/U.S. Geological survey seismic project in the Wright Valley.

Leader of the team was again Garth Varcoe who was accompanied

by Dave Earl, radio operator, Kevin Jenkins, drill supervisor and drillers Max Williams and Wayne Little. They left Scott Base on October 19 at 7 a.m. and reached Butter Point at 8 p.m., camping there to dig out and load other equipment left from the previous season before going on to Marble Point from where Garth Varcoe and Dave Earl subsequently returned to Scott Base.

From Marble Point the equipment was airlifted to the drill site 4.2 km east of Vanda Station just below Bull Pass on the northern face of the Wright Valley. The required 42 helicopter flights were made between 29 October and 8 November.

DRILLING

Working in two shifts from 8 a.m. to 4 p.m. and from then to midnight the drill team which also included Pat Cooper and Graham Brown used the Longyear 44 drill. They completed the first hole of 100 metres in eight days. It was $7\frac{3}{4}$ " in diameter and produced a core, composed mostly of granite, of $6\frac{1}{2}$ ". The hole required to be not more than 3 degrees off vertical was drilled .31 degrees error. A second hole of 30 metres was completed in six days on November 30.

SEISMOLOGY

The holes will house seismometers from which data will be transmitted via repeater stations at Mt. Newall and Crater Hill to Scott Base. It will be recorded on equipment to be installed in the physical sciences laboratory and stored for subsequent transmission to the data collecting centre of the Geological Survey Centre at Albuquerque in the United States.

Drilling equipment was returned via Marble Point to Butter Point in readi-

ness for the second stage of the CIROS project next season.

In 1984/85 the CIROS 2 hole cored units of well sorted sand and laminated sand-mud "couplets". These were unusual lithologies in a glacial moraine sequence.

EXPLANATION SOUGHT

Scientists from Victoria University sought this season to explain this feature. Working with a gravity corer with a 30 cm diameter they obtained samples from the sea floor near the outfall of two meltwater channels on the Ferrar Glacier and compared the sediments. The channels contained sorted and bedded sand "bars" and larger rock debris. The samples comprised poorly sorted sandy mud with dropped pebbles and sand deposited by ice rafting. The wide dispersal of the sand settling in the water column however contrasted with the well sorted sand in the CIROS core and did not provide an explanation for it.

Led by Alex Pyne the team comprised Andrew Macpherson and David Kelly of Victoria University and Peter Dawkings, an Antarctic Division field assistant. The specially designed and built under water-camera with which they had planned to obtain photographs of features indicating sediment transport directions in McMurdo Sound posed technical problems. The team also endeavoured to recover sediment traps moored on glaciers in New Harbour and Granite Harbour as part of a joint project with Rice University. Although they found the anchors the traps were thought to have been lost through ice breakout.

Next season the team hope to study the vertical sediment flux in the area in co-operation with Rice University and in association with the CIROS programme.

During three weeks between late October and mid-November Dr Chris Adams and Pam Whitla of the Institute of Nuclear Sciences, DSIR, Wellington collected approximately 50 samples of microschists and other metamorphic rocks from the Lower Wright Valley and mid-Victoria Valley near Lake Vida for dating by rubidium-strontium methods.

The samples were sent to the Institute for crushing. Preliminary xray fluorescence analysis has begun. This will give the rubidium-strontium ratio which in conjunction with strontium isotropic measurements will provide data from which the age can be calculated. The results should assist in identifying the earlier phases of regional metamorphism before the emplacement of Granite Harbour intrusives and the associated gneisses and migmatites.

Paul Fitzgerald of Melbourne University and Ken Woolfe of Victoria University spent two and half weeks in the Beardmore Glacier area collecting samples of granite from exposed intrusions. They worked from the U.S. Antarctic programme campsite on the Beardmore Glacier and field camps established at Granite Pillars near the mouth of the Beardmore and on the Miller Range. Apatite contained in the granite samples will be analysed using fission track dating techniques at Melbourne University and should contribute to knowledge of the timing and rate of uplift in this area.

SEALS

Camping on the northern shore of Razor Back Island Lincoln College scientist Dr Graham Barrell assisted by Sandy Sandblom of Christchurch took blood samples and placed melatonin implants in 17 lactating seals. Blood was also taken from a

further 17 seals for comparative purposes.

Melatonin is a hormone which is usually secreted under conditions of darkness and is of particular interest because in many animals it influences the timing of seasonal events such as reproduction. The role of the hormone in the physiological processes of the Weddell seal, which reproduces in conditions of full daylight, is unknown.

Further samples taken from 31 of the 34 seals which could be found two weeks later and have been sent to Lincoln College for analysis.

Observations and photography of icebergs in the Ross Seas was continued by Denis Fowler DSIR and Karen Williams working for the Commission for the Environment.

Flying in a northbound RNZAF C130 Hercules at 2,400 metres along the middle of the fast ice strip off the coast of Victoria Land in western Ross Sea they detected 315 bergs between the Blue Glacier and the Nordenskjold Ice tongue. It is estimated that this would include bergs longer than 70 metres and approximately 70 percent all bergs present in the area.



An oblique aerial photograph of icebergs in the fast ice off Oates Piedmont glacier and Gregory Island taken with a 70 mm Hasselblad camera from an RNZAF C130 hercules flying at 2,400 metres. The large iceberg on the left is 3 km long and broke off from the Mackay glacier tongue in February 1983 and the tabular berg on the right has drifted from Cape Roberts which is to the south of the photograph.

— Photograph: Denis Fowler, DSIR.

Between 20 and 40 percent of the bergs were in the same position as the previous season and are therefore considered to be firmly grounded. No bergs recorded in the study area have been resighted outside of it.

On the basis of previous data the net drifts of 23 further icebergs has now been determined. Most of the activity can be attributed to the regional current setting north along the Victoria Land coast in this area although one large berg had drifted west from near the site of DVDP 15. This has been attributed to a current deflected by a submarine spur in the area.

MT. EREBUS

The annual deformation surveys of the Mt. Erebus summit area was carried out by Graeme Blick and Roger Williams of the New Zealand Geological Survey in Wellington. They were assisted by Peter Brailsford of Antarctic Division.

On the summit for three days in temperatures of -15 deg C the team made horizontal angle observations and distance measurements of the

horizontal control network. With the exception of a minor difference at one point the survey showed little change with no reversal of an expansion recorded in 1984. The three tilt levelling patterns were relevelled but the changes bore little relation to the active vent.

Volcanic activity was found to have decreased significantly since the previous survey in December of 1984.

A small lava lake of approximately 20 in. in diameter was found in the active vent. Four eruptions were observed. Each consisted of a single explosion some throwing bombs out of the lava lake. The two new vents observed in 1985 were found to be dormant.

This was the sixth survey to be made on Mt. Erebus as part of the International Mt. Erebus Seismic Studies (IMESS). The surveys are designed to monitor ground surface deformations of the summit portion of the mountain which contains an active lava lake. This provides opportunity to study possible ground deformations associated with volcanic activity.

Pilot underwater diving project

A pilot underwater diving programme conducted by three members of an Auckland University team and diving supervisor was successfully completed in mid-November. Although New Zealanders have dived in Antarctica before this is the first time New Zealand scientists have undertaken a programme such as this.

The team were in Antarctica to continue studies of fish feeding and cold adaptation. Focussing on the pagothernia borchgrevinki, studies were made of the role of zooplankton in

fish feeding and the functions of lateral lines. They also looked further at aspects of vestibular reflex functions.

Led by Dr John Montgomery the team comprised Dr John MacDonald, John Cargill and Gary Housley. They worked closely with Dr Brian Foster and Tref Barnett for part of the project. All were from Auckland University Zoology department. The diving supervisor was Steve Mercer of Agriculture and Fisheries Department in Wellington who is a technical advisor to Antarctic Division.

The pilot diving programme this season was largely a logistics exercise the experience of which the team hope to use in future to further their study. The divers were John Montgomery and John MacDonald and Gary Housley.

Using dry suits, neoprene mits, standard dive weights and two sorts of regulators the team dived in pairs or with a standby diver. A life line attendant was also present.

Each of the dives, made over three days, was between 20 and 28 minutes duration. The first, for orientation, was made from the USARP Hut 9, 150 m west of Observation Hill in Erebus Bay. Working down to 20 metres in water temperatures of -1.9°C the team found the bottom, overlaid by silt, shelved gently to an edge with a sudden drop off. It was rich in invertebrate fauna. There were large numbers of small benthic fish, *T. bernachii* predominated.

SAMPLES

On the second day diving operations were moved to the fish hut 1.5 km south of Scott Base over water 315 metres deep. Team members dived individually with a stand-by diver and life line attendant. Invertebrate fauna in the sub-ice platelet layer was investigated and found to be sparse, pelagic amphipods were collected from the ice crystal layer. Three photography dives were made.

USARP fish hut No. 4 approximately 50 metres from the shore in Erebus Bay was the site of the diving for the third day when further photography was undertaken and a pycnogonid (sea spider) with barnacles was collected from a rocky sea floor

south of the hole.

LATERAL LINE STUDIES

As in all fish the function of lateral lines is very much in dispute. Although detection of prey is largely visual, non-visual systems would be used in winter dark or turbid water. In the borchgrevinki an anterior lateral line system consists of 6 short dermal canals on each side of the head, opening to the outside through a series of pores. Vibration sensitive neuromasts lie in the canals between each pair of pores.

Working under aquarium conditions a vibrating probe was positioned in the water near the fish and the activity of the sensory neurons recorded from the root of the lateral line nerve with glass micropipettes.

It was found that sensory organs functioned at between 30 and 50 cycles per second. Vibrations produced during swimming were also recorded from three species of crustacea found in the diet of the borchgrevinki. The swimming crustacea were attached to a strain gauge and produced low frequency peaks at 3-6 hz with high frequency peaks of about 40 hz.

When an amphipod was suspended near the head of the fish simultaneous strain gauge and nerve recording confirmed the vibration produced by the crustacean swimming is a potent natural stimulus of the anterior lateral line.

As a result of the experiments the team concluded that the anterior lateral line of the borchgrevinki may play an important role in the close range co-ordination of feeding.

Work on vestibular reflex activity in the borchgrevinki was also continued. Vestibular reflexes are

associated with balance. The purpose of the study is to investigate the properties of brain function at very low temperatures.

Gut contents of seven borchgrevinki, caught through the sea ice 1500 metres south of Scott Base and 45 km from the edge of fast ice were weighed, identified and are still under analysis. Initial results indicated that they were feeding on larger zooplankton and other fish larvae. This work was in conjunction with Brian Foster and Tref Barnett who undertook a sustained and replicated zooplankton sampling programme to assess the variation and occurrence of the different plankters. The teams hope to establish a planktivory of the borchgrevinki as part of the study.

Working at the fish hut, and sites off Horsehoe Bay and in Wohlschlag Bay 110 plankton samples were collected by Brian Foster and Tref Barnett who were assisted by Brian Smith, an Antarctic Division field assistant. By sampling different depths of the water column they collected enough samples for a data matrix of depth versus time against species, the results of which will be compared with other samples obtained near the edge of the ice in the Sound. From the results they hope to build a faunistic account of the zooplankton which will be compared with other world-wide studies of the role of zooplankton and fish in temperate inshore ecosystems.

RNZAF logistic support

An RNZAF Iroquois helicopter has spent six weeks in Antarctica. Although the New Zealand airforce has operated in the region for nearly 30 years this is the first time a helicopter has been sent south.

Seventeen return flights were made by RNZAF Hercules transport aircraft of No. 40 Squadron flying as "Operation Ice Cube 85" under the joint New Zealand United States logistic agreement. The first flight south left on October 5 and the last north on December 14.

Operation ice cube began in 1965. Before then the RNZAF had an Antarctic flight equipped with Auster and Beaver aircraft which operated from Scott Base between 1957 and 1961. This seasons deployment of the Iroquois was made under the logistics agreement, of which operation ice cube is part.

The Iroquois, nicknamed "Orange Roughy" because it was painted

bright orange to match its US Navy counterparts and its 15 man support crew was flown to and from Antarctica on ice cube flights. The detachment known as "Operation snowbird" was from No. 3 Squadron and under the command of Squadron Leader B.L. Phillips, who is based at Hobsonville.

While in Antarctica the Iroquois operated from McMurdo Station as part of the U.S. VXE-6 operations supporting field activities. Some of the VXE-6 helicopters were based at the Beardmore camp, 400 miles from McMurdo, for a large part of the season. The New Zealand helicopter was able to make up for some of the shortfall. It flew 91.1 hours.

At a small ceremony near the end of the operation No. 3 Squadron members were presented with Antarctic Service Medals and certificates by the Commanding Officer of VXE-6, Commander Paul DeRoucher. To qualify for the medal, 30 days of



"Orange Roughy", the RNZAF's first Iroquois to serve in Antarctica, being unloaded from a No. 40 Squadron C130 on October 27.

continuous service in support of Operation Deep Freeze is required. The time must be spent in service south of 60 degrees.

New Zealand army personnel again handled cargo loading and unloading operations at both Christchurch and the McMurdo Station.

Footnote.

In addition to its temporary orange colour the helicopter carried a picture of "Dog", from Murray Ball's Footrot Flats cartoon, on one door. That came about after members of the Canterbury Branch of the Antarctic Society wrote to Mr Ball, suggesting that as Dog had missed out on a trip to South Africa, he might like to visit Antarctica to see the dogs there, and the penguins. Mr Ball agreed and the Dog with his ears flying back appeared on the co-pilots door where he was in a perfect position to obtain a birds view of all that was happening in McMurdo Sound. The Footrot Flats cartoon series depicts aspects of New Zealand country life. Dog is one of the principal characters.

Starlifter drops

46 tonnes of cargo

More than 46 tonnes of mail, fresh food, and supplies were dropped to 115 men and women at the Amundsen-Scott South Pole Station, McMurdo Station, and Scott Base by a United States Air Force Starlifter which made two mid-winter flights from Christchurch on June 23 and 25. This was the seventh such drop in 10 years and the fifth to the South Pole. A KC10 tanker refuelled the Starlifter on each flight.

Operations were delayed twice because of high winds, blowing snow, and reduced visibility at McMurdo Station on June 21 and 22. On June 21 the Starlifter encountered winds up to 50 knots and zero visibility in the McMurdo Sound area. It flew over

CONTINUED ON PAGE 446

Mercy flight to Davis ends tragically

Three nations — New Zealand, the United States, and the Soviet Union — responded to an Australian appeal for aid to evacuate a badly burned man from Davis Station for specialist treatment. A United States ski-equipped Hercules flew 1454 nautical miles from McMurdo Station to Davis on October 29, landed on the sea ice, and picked up Mr Stephen Bunning who had second degree burns over 70 per cent of his body. Tragically, Mr Bunning died on the return flight in the early hours of October 30.

A 34-year-old building foreman with the Department of Housing and Construction this winter, Mr Bunning was badly burned in a workshop accident on the afternoon of October 28. He was treating a water tank with plastic sealant when it ignited.

When the station medical officer, Dr Peter Sullivan, advised the Antarctic Division in Hobart that it was imperative to get Mr Bunning to hospital for specialist treatment, the director, Mr Jim Bleasel, called Mr Bob Thomson, director of the New Zealand Antarctic Division in Christchurch. McMurdo Station was advised by a message relayed through Scott Base and preliminary planning began.

To co-ordinate operations Mr Thomson arranged a satellite communications link between Christchurch, Hobart, McMurdo Station, and Casey and Davis Stations. Captain David Srite, Commander U.S. Naval Support Force, Antarctica, was able to make a Hercules available for the 2908nm flight between the stations but as it would have to land on the sea ice in front of Davis the planners had to determine first whether the ice could bear the weight of the aircraft and the bulldozers which would have to clear

a 2000m strip of snow.

Tests were made by members of the winter team every 10m along 2000m of sea ice. It was found that a landing was possible although at one point the ice thickness was just inside tolerance level for the Hercules. In less than eight hours of the decision to land on the sea ice two bulldozers had cleared the necessary strip.

Earlier, in case the Hercules had to make an open field landing on the Polar Plateau about 30km inland from Davis an alternative plan had been prepared for the transfer of Mr Bunning from the station. The Royal New Zealand Air Force was ready to fly a light Aerospatiale Squirrel helicopter (to be provided by Helicopters (N.Z.) Ltd) in one of its wheeled Hercules aircraft from Christchurch to McMurdo Station. There the Squirrel could be loaded directly into the U.S. Hercules without dismantling. It could then be used between Davis and the Polar Plateau.

RESPONSE TO CALLS

In response to Australian calls for all available international help the Soviet Union offered to send an Mi-8 helicopter to carry the injured man to Molodezhnaya Station 729nm from Davis. Molodezhnaya has two doctors during the winter and a well-equipped hospital. But the offer had to be declined because of the time factor.

When the Hercules took off from Williams Field at 3 p.m. (local time) for Davis it was flown by Commander Paul Derocher, who commands the U.S. Navy's VXE-6 Squadron, and carried a medical team of a Navy flight surgeon and a senior hospital corpsman. Weather information had been provided earlier by other stations, including Casey and Davis, and they

continued to monitor conditions during the mission.

Shortly after 9 p.m. the Hercules made an uneventful landing on the sea ice which was about 1.35m thick. The aircraft took off shortly before 10.30 p.m. (local time).

Although Mr Bunning's condition was considered critical he was conscious before he left Davis and aware he was being flown to Christchurch by way of McMurdo Station. He was given emergency treatment by the medical team but died at 12.27 a.m. on October 30. His death was the result of inhalation burns within his lungs. The Hercules landed at Williams Field at 3.27 a.m. (local time).

Arrangements had been made in Christchurch for Mr Bunning to be

taken to Burwood Hospital, which specialises in the treatment of burns cases, after being flown back from McMurdo Station in a United States Air Force Starlifter. His body was flown back the same day.

Australian appreciation of the efforts made to bring Mr Bunning from Davis was expressed by the Prime Minister (Mr Bob Hawke) in a letter to the United States Embassy in Canberra. He thanked all concerned on behalf of the Australian people and the winter teams at Mawson, Davis, and Casey. Mr Hawke added that while Stephen Bunning's life had not been saved the mission was a dramatic demonstration of the spirit that unites people working in Antarctica and the close co-operation which exists under the Antarctic Treaty system.

Chinare

Return to King George Island

China, admitted as a consultative party to the Antarctic Treaty in October, will send its second research expedition to Antarctica in November. Last season the first expedition established a summer station, Chang Cheng (Great Wall) on King George Island in the South Shetlands.

This season the Chinese National Antarctic Research Expedition (CHINARE) will send a team of 30 scientists to King George Island to carry out projects in geology, geophysics, marine biology, and cartography. An unspecified number of foreign scientists and overseas Chinese have been invited to join the expedition. Two Argentine scientists, one from the Argentine Navy, accompanied the first expedition.

Great Wall Station is on the east side of the Fildes Peninsula at 62deg

12min S/58deg 57min W about 2.3km from the Chilean and Soviet stations, Teniente Rodolfo Marsh and Bellinghausen. It has accommodation buildings, a weather observatory, a heliport, two oil depots, and a wharf. Fildes Peninsula is one of the most extensive ice-free areas in the maritime Antarctic.

Two ships, the oceanographic research vessel Xiang Yanghong No. 10 and the Chinese Navy's salvage ship J121, which served as the logistic support ship, took the first expedition

of 591 scientists, construction workers, and crew members to King George Island. The ships sailed from Shanghai on November 20, 1984, and returned on April 10 this year.

On December 29 three days after the Xiang Yanghong anchored in Maxwell Bay the Chinese National Committee for Antarctic Research decided to establish a summer station on King George Island. While construction workers were engaged on building the station, scientists on the island and aboard the research vessel began a series of surveys covering biology, hydrology, geology, chemistry, geophysics, and meteorology. A topographical map of the area surrounding the station complex was produced and biologists also studied penguin colonies on nearby Nelson Island.

Much of the marine research from the Xiang Yanghong was concerned

with the ecology of krill as part of China's contribution to SIBEX, the second stage of the Biological Investigation of Marine Antarctic Systems and Stocks (BIOMASS). Samples of phytoplankton and zooplankton were obtained and on January 1 experiments were conducted aboard ship with live krill.

In a survey of Fildes Strait which runs generally east to west between King George Island and Nelson Island the marine biologists discovered about 130 kinds of seaweed and more than 400 kinds of lichen and bryophytes in the waters west of King George Island the offshore area. On January 18 a biologist dived to a depth of 50m for five minutes and emerged with a collection of geological specimens and sedimentary deposits from the seabed which were taken back to China for detailed study.

10 die in air crash

Eight United States tourists and two Chileans were killed on December 31 when a Chilean charter airline's Cessna Titan 404 crashed off the coast of King George Island, South Shetlands. The tourists were on their way from Punta Arenas to spend New Year's Eve at the Chilean Air Force station, Teniente Rodolfo Marsh.

Chilean Air Force pilots found the bodies of the passengers and crew in the wreckage of the Cessna 10km from the station. The pilot of the Aero Petrel twin-engined aircraft approached the airfield in low visibility, made one pass, and then circled the area. His aircraft apparently hit one of the islands off the Fildes Peninsula where Marsh Station is situated.

Aero Petrel, a small charter airline, which operates from Punta Arenas,

the Chilean port of Tierra del Fuego, began tourist operations in the 1983-84 summer when it flew 30 passengers on five trips to Teniente Marsh. This season's trips were made under charter to Sports Tour Chile, a United States travel agency based in Key West, Florida.



Italy plans Terra Nova Bay Base

Italy, which acceded to the Antarctic Treaty in 1981, plans to spend upwards of US\$130 million on scientific research in Antarctica over the next five years. Sites for a future permanent station in the Ross Dependency will be assessed by a small expedition which will make a 60-day reconnaissance cruise in the Ross Sea this summer, particularly in Terra Nova Bay on the west coast of North Victoria Land. The expedition left Lyttelton this month and will return in February.

This season the Italian Government has provided US\$5.3 million for the expedition's research and support. The Norwegian Arctic ice-strengthened research vessel *Polar Queen* (1050 tonnes) has been chartered from G.C. Rieber and Co. Ltd, of Bergen, and Helicopters (N.Z.) Ltd, of Nelson, has obtained a first stage contract to provide two *Aerospaziale Squirrel 350* helicopters and pilots to support the expedition during the summer.

N.Z. LINKS

New Zealand's association with Italian polar scientists began in the International Geophysical Year (1957-58) when Lieutenant Franco Faggioni, of the Italian Navy, wintered at Scott Base. Italy has sent five expeditions to Antarctica and the sub-Antarctic, one privately sponsored, and three expeditions since 1968 have worked in the Ross Dependency with New Zealand scientific and logistic support.

In the 1982-83 season two representatives of the Italian National Research Council (CNR), Dr Carlo Stocchino and Dr Marcello Manzoni, visited Scott Base, Vanda Station, and McMurdo Station, to conduct feasibility studies for an Italian Antarctic research programme. They

also visited the former joint U.S.-N.Z. station at Cape Hallett in January last year as part of their preparation of an Antarctic research programme for the NCR.

ARMY LEADER

Leader of the expedition is an Italian Army officer, Colonel Ezio Sterpone. Dr Stocchino is the scientific co-ordinator for the CNR.

Colonel Sterpone belongs to the *Corpo d'Alpini*, the mountain troops regiment. He is an experienced skier, has climbed extensively in the Italian and Swiss Alps, and is a member of the Italian Alpine Club which has honoured him for his ascents of certain peaks.

Projects manager for the expedition in Italy is Mr Celio Vallone, who visited New Zealand in September to discuss arrangements with the Antarctic Division and other organisations. He is an engineer with ENEA, an agency of the Department for Protection of the Environment and Human Welfare concerned with the organisation of the Antarctic programme.

CNR, which is also responsible for the development of nuclear energy and alternative energy sources, has organised a research programme covering projects in biology, geology,

geophysics, vulcanology, oceanography meteorology, and topography. These projects will be carried out by 14 scientists who will work from the Polar Queen in Terra Nova Bay with helicopter support to field sites ashore.

In addition to Dr Stocchino the scientific team includes: Professors Andrea Anav, Ivo di Menno (meteorologists), Guido di Prisco (biologist), Bruno Lombardo and Marcello Manzoni (geologists).

Six universities are represented by Professors Luigi Carmignani (Pisa), Guido Gosso (Torino), Guiseppe Orombelli (Milan), geologists; Letterio Villari (Messina), vulcanologist, and Giorgio Caneva (Genoa), geophysicist. ENEA and industry have Dr Massimo Frezzotti (geologist), Rodolfo Cappelletti (surveyor) and Fabio Giovinazzo (geotechnician).

FIELD GUIDES

A team of field guides with mountain rescue experience has been assigned to the expedition by the Ministry of Defence. They are: Lieutenant-Colonel Mauro Spreafice (guide), Mario di Capua (doctor), Captain Enzo Giacomini (guide), and Staff Sergeant Lorenzo Boi (guide). The radio operators Francesco Morassi (Navy) and Aldo Scherillo (Air Force) are senior N.C.O.'s.

Mr Joern Fortun, of the Norwegian Polar Institute's logistics division, who is the expedition's logistics manager, heads a group of Norwegian field guides with Arctic experience. Two of them, Captain Ola van der Eynden and Lieutenant Justein Helgestad, are Norwegian Army officers serving in a private capacity. The others are Jon Fadnes and Terje Olsen.

Discussions have been held with the New Zealand Antarctic Division since the Italian Government decided on a general investigation of polar

institutions and Antarctic operations, and the director, Mr Bob Thomson, is advising the expedition. He will join the Polar Queen in Terra Nova Bay, probably during a science cruise by the United States Coast Guard icebreaker Polar Star when he flies south later in the season.

Master of the Polar Queen, which has a crew of 11 to 13, is Captain Magnar Aklestad. He took the ship to the Ross Sea with a West German expedition in the 1982-83 season, and knows Terra Nova Bay well.

SECOND VISIT

On her way back to Lyttelton the Polar Queen will call at Cape Hallett. Mr Thomson has arranged for the expedition to pick up and bring back cargo from the former joint United States-New Zealand Hallett Station. A maintenance team of four men from the Antarctic Division will spend a month at the station early next year on a works programme to minimise the effects of former human habitation at the site.

Although the Polar Queen is primarily an Arctic research and offshore survey vessel she has operated in Antarctic waters before. She arrived in Lyttelton on December 6 and sailed to the Ross Sea several days later. In the 1981-82 season she was chartered by the West German Alfred Wegener Institute for Polar Research to carry additional construction materials and supplies for Georg von Neumayer Station in Atka Bay on the Ekstrom Ice Shelf and the Filchner summer station on the Filchner Ice Shelf. She also supported research at both stations.

After her voyage to the Weddell Sea side of the continent the Polar Queen was chartered in the 1982-83 season by the West German Federal Institute of Geosciences and Natural Resources (BGR) to take GANOVEX

III to North Victoria Land. The purpose of this expedition was to continue and finish the work of GANOVEX II which had only started when the Gotland II sank in December, 1980.

On her first voyage south the Polar Queen carried five Hughes 500 helicopters chartered from a Canadian firm. One was damaged at Wellington and replaced by a New Zealand helicopter. This time the Squirrel helicopters she will carry will be flown by experienced New Zealand pilots, one

of whom has operated in North Victoria Land before. They are Mr Jim Wilson (chief pilot) and Mr Trevor McGowan. Two company engineers will work, with the pilots. Peter Gibbs will go first; Neil Marwick will relieve him later.

In the 1979-80 season GANOVEX chartered two Hughes 500 helicopters from Helicopters (N.Z.) Ltd. Mr Wilson was one of the three New Zealand pilots aboard the expedition's chartered ice-strengthened vessel Schepelsturm.

Swedish Polar Research with N.Z.

Future co-operation between Sweden and New Zealand on scientific research in the Antarctic and Arctic will be discussed early next year by Mr R.B. Thomson, director of New Zealand's Antarctic Division, and Professor Anders Karlqvist, director of Swedish polar research. They will meet in February when Professor Karlqvist returns from a visit to Australia's Antarctic bases.

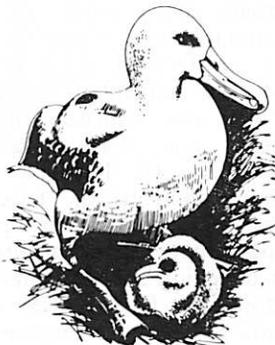
Preliminary discussions on co-operation between Sweden and New Zealand were held in Christchurch this year by Mr Thomson, and Dr Bo Johnson Theutenberg, legal adviser to the Swedish Ministry of Foreign Affairs after their return from the Antarctic Treaty workshop on the Beardmore Glacier.

These discussions were followed later in the year by a meeting between the Swedish Foreign Minister (Mr Lennart Bodstrom) and the New Zealand Minister of Foreign Affairs (Mr David Lange). They announced in a joint communique that the two countries have agreed to co-operate actively

in polar scientific research in the Antarctic and Arctic, and work towards signing a treaty on the subject.

Sweden is also interested in trying to develop co-operation with Australia in Antarctic research, according to the Australian Minister for Science Mr Barry Jones. Professor Karlqvist, accepted the Minister's invitation to visit Mawson, Casey, Davis — from November throughout the summer.

Reference: "Antarctic", December, 1984. Pages 306-7.



BAS

British resupply bases and begin field work

The 1985/86 season began with the departure on September 20 of the three Twin Otter aircraft from the U.K. where they had been serviced during the southern winter. As usual, they were flown south via North and South America and arrived at Rothera on October 7.

All three were engaged the following day in ferrying cargo to Fossil Bluff, the advanced base in George VI Sound, which was then reopened. The base will again be manned throughout the summer as a staging post for the aircraft and field parties. Further stores were flown there later. Aerial sea ice observations were undertaken on the initial flight to Rothera and subsequently, in preparation for the ships' arrival.

Unfortunately, prolonged violent winds with rapid changes of direction were experienced at Rothera in the second half of the month and resulted in aileron and rudder damage to two of the aircraft. A Canadian Borekair Twin Otter, chartered by the U.S. National Science Foundation, was due to fly to Siple station via Rothera at about that time and was able to take the necessary spares south, and the B.A.S. aircraft were repaired and test-flown on October 31. In the meantime, the rudder of the third aircraft was also damaged, but a replacement was made available immediately by De Havilland and flown via London to the Falkland Islands where it was picked up by R.R.S. John Biscoe. Had the aircraft been out of action for any length of time before the field parties were established, the summer programmes would have been seriously disrupted.

The John Biscoe had left Grimsby

on September 17 and sailed south via Montevideo, arriving in the South Shetland Islands on October 23. Two men were put ashore at Livingston Island for two weeks, to begin an investigation into the mineralization of the Antarctic Peninsula region. The ship proceeded to Damoy, Wiencke Island (off the west coast of the Antarctic Peninsula) from where fourteen field workers were to be flown south via Rothera.

TO FALKLANDS

The ship then headed for the Falkland Islands, to off-load cargo destined for Bird Island, South Georgia, and take on the aircraft rudder. By November 2, the ship had rounded Trinity Peninsula and was one mile from James Ross Island. A twelve-man geological field party was landed the following day to continue a comprehensive survey of the island. The ship returned to Livingston Island to pick up the two men and take them to Anvers Island, calling at Palmer station before relieving Faraday station on November 8-9. An attempt was then made to reach Rothera but the ship was held up by pressure ice west of Adelaide Island.

Meanwhile, the James Ross Island party had run into difficulties. While relaying the stores across a bay, two

motor toboggans and sledges and some fuel were lost through the sea ice, where it had been rotted by a meltwater stream. Fortunately, the men involved were unhurt, and the rest of the men and stores were still at the first camp site. The general condition of the Prince Gustav Channel ice was found to be unusually poor for the time of year and deteriorating rapidly, so it cannot be used for a geophysics traverse of the Channel, as planned, nor to facilitate travel around the island. Lack of snow on the island is also restricting travel and it is doubtful whether much field work will be possible.

R.R.S. Bransfield sailed from Grimsby on October 30 and will

proceed south via Montevideo and Stanley. The ship will call at South Georgia, Bird Island and Signy (South Orkney Islands) before relieving Halley Station, and will later assist in geological landings in the Antarctic Peninsula area.

One innovation this season has been the chartering of the (private) French yacht *Damien* for six weeks, to enable B.A.S. biologists to carry out an elephant seal census around South Georgia. The yacht can reach isolated beaches in the numerous small coves, even in rough conditions. It is to be chartered for a further six weeks for a penguin census around the exposed and precipitous Willis Islands, beyond Bird Island off the northwestern tip of South Georgia.

R.R.S. John Biscoe trapped

On 13 November, while attempting to reach Rothera, the John Biscoe became trapped in a 15 mile wide belt of pressure ice off Adelaide Island, about 4 miles in from the ice edge. The following day the ship managed to move one mile, but strong northerly winds were increasing the pressure and forcing her towards icebergs.

RS Polar Duke, on charter to the US Antarctic Research Program and about 20 hours steaming away, went to the John Biscoe's assistance, arriving on the 16th November. By the following night the John Biscoe was almost free when a severe northeasterly gale compacted the ice again, forcing the ship to drift dangerously near icebergs grounded on a shoal west of the Amiot Islands. The ship was abandoned and the 31 officers and crew and 33 expedition members were transferred to the Polar Duke

which then proceeded to Palmer Station.

In a subsequent rendezvous with the West German ship Polarstern the John Biscoe's captain, Chris Elliott and 19 of his officers and crew and four expedition personnel were transferred from the Polar Duke. The Polarstern broke through the pack ice reaching the John Biscoe on 20 November. BAS personnel were transferred to her by crane.

An initial inspection indicated that there was no damage and the ship was able to move out of the ice under her own steam, escorted by the Polarstern. She then went north to Palmer Station and the 40 passengers and crew accommodated by the Americans were reembarked and the ship proceeded to Damoy Station on Wienecke Island. At the end of the month she was thoroughly inspected by BAS divers at Signy. They found no damage.

This will be combined with an aerial survey of the penguin colonies by helicopters from H.M.S. Endurance.

At the stations, routine work has continued and preparations have been made for the coming summer. At Rothera in September, 1,200 drums of fuel were taken up to the airstrip, and the two mobile huts there were jacked up above the accumulated snow, ready for the arrival of the BAS aircraft in early November. A Canadian Twin Otter, piloted by ex-B.A.S. pilot Giles Kershaw, also arrived. It was carrying a party of Canadian and American climbers heading for the Ellsworth Mountains. Two groups of Korean climbers are to be picked up later by the aircraft — from Punta Arenas and Marsh station.

Several short journeys were made by B.A.S. men from Signy, Faraday, Rothera and Halley stations, chiefly for recreation, in September and October. As usual, one of the chief attractions at Halley has been the nearby emperor penguin colony.

OTHER PROGRAMMES

The scientific field programmes to be undertaken this summer were outlined in the September issue of 'Antarctic', but one item not mentioned was the long-term optical monitoring of the ice sheet. The Antarctic Peninsula is an area sensitive to climatic change and is likely to be one of the first places to give an indication of trends which may affect the whole continent.

The remeasurement of lines levelled optically over the ice between benchmarks on rock provides evidence of surface-level fluctuations. This year a surveyor will visit Palmer Land and Alexander Island to study five lines set out in 1975 and 1976, only one of which has been subsequently levelled. The lines will be relevelled as close as possible to the month

and day of the original surveys, to ensure that fluctuations over the ten-year period are not masked by seasonal cycles.

Measurements in Greenland indicate that the ice is now thinning at the coastline and thickening in the central area, and it will be interesting to compare these with any changes in the Antarctic Peninsula area. The most obvious change in the latter, in the past few decades, has been the reduction in the extent of the ice shelves.

Halley's comet observations

Halley station, which was named after Edmund Halley, 1656-1742, the second Astronomer Royal and a distinguished Secretary of the Royal Society, will be participating in the International Halley (comet) Watch from mid-March to May 1986. The station is particularly important as it is one of the few southern hemisphere stations at about long. 30deg W. (The comet will, by then, be in the southern sky). It will undertake photography and photometric studies, monitoring development of the comet's tail.

A series of four commemorative Halley's comet stamps will be issued in the British Antarctic Territory in early 1986. They will depict Edmund Halley (from a portrait at the Royal Society), Halley station with a background of stars, Peter Apian's observations of Halley's comet in 1531 and the Giotto spacecraft which has been launched to intercept the comet. Information about the subjects will be given in a leaflet in the first-day cover.

United States begin detailed study of Beardmore Glacier

A detailed study of the Beardmore Glacier area in the Transantarctic Mountains less than 400 nautical miles from the South Pole will be the major scientific project in the United States Antarctic Research Programme (USARP) for the 1985-86 season which began officially on October 1. More than 60 scientists, supported by aircraft and helicopters, will study glacial deposits to learn more about the growth and decay of the East Antarctic Ice Sheet, and search for more vertebrate fossils which may provide clues to the relationship and distribution of the world's land animals about 240 million years ago.

Scientific projects and logistic support for the research programme as well as the maintenance of four permanent coastal and inland stations, all financed and co-ordinated by the National Science Foundation, are expected to cost US\$110.1 million plus this season. U.S. scientists will work at McMurdo Station, Amundsen-Scott South Pole Station, and Palmer Station on Anvers Island, Antarctic Peninsula. They will also conduct upper atmosphere research at Siple Station in Ellsworth Land, which was closed last winter, and will be opened again in November.

This season 320 scientists will be engaged in 87 research projects on the Antarctic Continent, in the Southern Ocean, in the Antarctic Peninsula area, at the South Pole, in Victoria Land, around McMurdo Sound, on Ross Island, and in East and West Antarctica. They will conduct joint research with scientists from the United Kingdom, France, New Zealand, the Soviet Union, Poland, Canada, and Japan.

In their activities the scientists will be supported by Hercules aircraft and helicopters flown by the United States Navy's VXE-6 Squadron, U.S. Air Force Starlifters, and the United

States Coast Guard's icebreakers Polar Star and Glacier. The NSF chartered new research vessel Polar Duke will support biological and oceanographic research in the Antarctic Peninsula area for the second summer, and the Military Sealift Command's new cargo ship Green Wave, which replaced the Southern Cross last summer, will again transport cargo between Lyttelton and McMurdo Station.

On her first cruise the veteran Glacier will support a marine geological project in the South Orkney Island-Bellingshausen Sea area. This summer scientists from Rice University, Houston, Texas, will investigate the sedimentary glacial record preserved in marine sections of the continental margin between the South Orkney Plateau and Marguerite Bay. They will take piston cores and conduct a single-channel seismic survey.

SCIENCE CRUISES

Late in February the Glacier will cruise in the Weddell Sea to support research along the ice edge. This work will be done from the research ship G.W. Melville operated by the Scripps Institution of Oceanography for AMERIEZ - Antarctic

Marine Ecosystem Research in the Ice Edge System.

Only the icebreaker *Polar Star* will operate in the Ross Sea this summer. After delivering passengers, fuel, and cargo to Palmer Station she will break the ice channel to McMurdo Station for the new tanker *Paul Buck*, which has replaced the *Maumee*, and the *Green Wave*. In January and February she will support four separate science cruises in the Ross Sea.

As in past seasons Starlifters of the U.S. Military Airlift Command and Royal New Zealand Air Force Hercules aircraft will make more than 35 flights south with scientists, support staff, and supplies for the United States and New Zealand research programmes. Flights by the wheeled aircraft from Christchurch to the sea ice runway in McMurdo Sound began early in October and will cease about mid-December.

MAJOR PROJECT

This summer the major scientific project of the programme will concentrate on the Beardmore Glacier area in the Transantarctic Mountains. The heavily-crevassed Beardmore, about 160m long and between 24m and 48m wide, is one of the glaciers draining the vast East Antarctic Ice Sheet into the Ross Ice Shelf. Because it lies near the centre of the continent and contains extensive ice-free terrain with well-preserved glacial deposits the Beardmore Glacier is an important testing ground for opposing hypotheses of Antarctic ice sheet behaviour during global ice ages.

Chief scientist for the Beardmore project is Scottish-born Dr David H. Elliot, professor of geology at Ohio State University, and director of its Institute of Polar Studies. He says that the history of the growth and fluctuation of the Antarctic ice sheets

may have started more than 30 million years ago.

Understanding of the time and magnitude of the fluctuations is rudimentary. One of the objectives of studying glacial deposits is to try to establish more accurately the growth and decay of the East Antarctic Ice Sheet and the times at which it may have covered the Transantarctic Mountains.

Between mid-November and late January about 60 scientists, mostly geologists, will work in the Beardmore Glacier area. They are from 12 United States universities and colleges, the U.S. Geological Survey, and New Zealand's Victoria University of Wellington.

In addition to Ohio State University the institutions are: Arizona State University, Augustana College in Illinois, University of California at Los Angeles (UCLA), Florida State University, University of Kansas, University of Maine at Orono, State University of New York at Albany, University of Pittsburgh, Vanderbilt University, Wayne State University and the University of Wisconsin at Madison.

ICE FIELD

Last season the main camp for the Beardmore project was established on the flat snow and ice field about 40m across in the Queen Alexandra Range. It was used first in January this year for the international Antarctic Treaty workshop. The area at 83deg 59min S/164deg 06min E provides a better landing site for ski-equipped Hercules aircraft and United States Navy helicopters which will transport the scientists and more than 30 support staff from McMurdo Station, and to field camps.

One team of geologists will try to determine the sources of sediments deposited by glaciers that may have

flowed over the peaks of the Transantarctic Mountains more than three million years ago. The data they get should help explain why these glacial deposits, now more than 2743m above sea level, contain marine microfossils.

Dr Elliot was one of a four-man team from Ohio State University that discovered the first land vertebrate fossil found in Antarctica. The fossil piece of the lower jawbone of an amphibian was found in 1967 in the central Transantarctic Mountains, about 282nm from the South Pole. The fossil was determined to be that of a labyrinthodont, an extinct amphibian that ranged in size from alligators to salamanders. They were the dominant amphibians of the late Paleozoic and early Mesozoic era, 350 to 200 million years ago.

Another group in the Beardmore Glacier project will search for more vertebrate fossils near the glacier to gain an understanding of the evolutionary history of many vertebrates that existed worldwide from the Permian to the Triassic periods, between 280 to 210 million years ago.

FOSSIL SEARCH

In a search for fossils of a different nature, paleobotanists will scour the fossilised peat deposits in the Queen Alexandra Range near the Beardmore Glacier for plants which have been permeated with silica. The structure of these plants has been exquisitely preserved.

Detailed studies can be made of the anatomy of these fossil plants. Most of the fossil plants found in other areas are preserved as compressions in which their internal structure has been destroyed. The anatomically preserved plants in Antarctica date back some 250 million years.

In another Beardmore area project,

a field party will search the Transantarctic region for meteorites. They are important to scientists studying the origin and evolution of planets and their moons because most are analogous to rocks from deep within the earth.

Antarctic meteorites are of special value because the deep-freeze conditions on the continent retain them in a pristine condition, with almost no contamination by organic materials since their journey from space. They are useful also in investigating possible changes in the rate of flow of meteoroids to earth and measuring the cosmic ray flow of past eras.

CLIMATE CHANGES

An Ohio State University team will try to determine climatic and glacial conditions that existed in Antarctica over the last 2,000 years and seek to establish a pattern of climate variations on that continent. The team includes Drs Lonnie G. Thompson, Ellen Mosley-Thompson and Thomas R. Sweet.

Recent analyses of ice cores about 457m deep, which record climate for as far back as 10,000 years, have shown that large-scale climate fluctuations, such as glacial and interglacial periods, occur at approximately the same time throughout the world.

To obtain data, drillers will retrieve one ice core about 457m long from a site near Siple Station near the base of the Antarctic Peninsula and four 106m ice cores in East Antarctica. Such shallow-depth ice cores give a record of climate variations since the beginning of the Holocene, about 10,000 years ago, and are essential for interpreting longer records. Antarctic data will be combined with that obtained from ice cores retrieved in South America, Greenland, Alaska and China. This combination, scientists believe, will enable them

to get a more complete picture of worldwide climate variations over the last 2,000 years.

Present physical and dynamic aspects of the West Antarctic ice sheet, whose behaviour is important for glaciology and for an understanding of world climate, will be investigated by a team from the University of Wisconsin-Madison, headed by Dr Charles R. Bentley.

Scientists will assess the behaviour of the ice sheet over the last few thousand years and conduct a geophysical survey around the Siple Coast of Marie Byrd Land. Radar soundings will be conducted on the ice sheet and its boundary with bed rock. In addition, magnetic surveys will be conducted from a chartered Twin Otter aircraft. These will be done over two ice streams and the areas draining into them. Gravitational and magnetic forces of the region's geology under the ice will also be surveyed.

MARINE STUDIES

This season about 12 scientists will continue the first major study of the ecologically important ice edge zone — where the Antarctic ice pack meets the open seas. The project headed by Dr Cornelius Sullivan, of the University of Southern California, is titled Antarctic Marine Ecosystem Research at Ice Edge Zone (AMERIEZ).

AMERIEZ scientists will conduct research in biology, physical and chemical oceanography, and acoustics at the edge of the ice shelf in the Weddell Sea from late February to the end of March. They will work from the Scripps Institution of Oceanography Research vessel *Melville*, and the United States Coast Guard icebreaker *Glacier*.

A major feature of the Antarctic region, the ice edge zone includes

most of the surrounding seas at some time during the annual freezing and melting seasons. At its maximum extent in early spring, the ice pack covers seven to eight million square miles, an area much larger than the 5,500,000 square miles that comprise Antarctica.

Many casual observations and some measurements suggest that the ice edge zone has a higher concentration of plants and animals and higher biological activity than either the open sea or the ice pack. This has led scientists to hypothesise that the ice edge is an important feeding area for marine birds and mammals. Preliminary data gathered during a cruise in the northern part of the Weddell Sea in November and December, 1983, showed that there were massive blooms of algae and large numbers of invertebrate grazing animals.

This season the scientists will try to increase understanding of the Antarctic marine ecosystem and provide information for rational management of Antarctic resources. They will gather further data not only on the biology of the ice edge but also on the physical and chemical conditions which maintain the heightened biological activity at the ice edge.

SULPHUR GASES

Scientists from the Universities of Rhode Island and Virginia will begin, in mid-December to investigate the hypothesis that sulphur gases produced by tiny marine plants may be a major source of sulphate aerosols over Antarctica. Dr Robert Duce (Rhode Island) and Drs Alexander A.P. Pszenny and James N. Galloway (Virginia) will work in the Scotia and Weddell Seas; in Drake Passage, between the southern tip of South America and the Antarctic Peninsula; and in Bransfield Strait, between

the Antarctic Peninsula and the South Shetland Islands.

Support for the biological and oceanographic investigations will be provided by the ice-strengthened research vessel *Polar Duke*. It replaced the research vessel *Hero* last season, and has been leased by the National Science Foundation for Marine and Coastal Studies in the Antarctic Peninsula area.

Sulphur in the form of sulphate constitutes between 80 and 90 percent of the atmospheric aerosols over Antarctica. Studies have shown that weathering of the earth's crust, sea salts, oxidation of atmospheric constituents, stratospheric aerosols and volcanism account for only two-thirds of this sulphur. Although it has not been confirmed, available data strongly suggest that much of the sulphur may come from marine biological sources, such as tiny plants called phytoplankton.

AND THE AEROSOL

During the summer the scientists will determine the concentration of gaseous sulphur dioxide and other sulphates in the boundary between the sea and the atmosphere. They also will estimate how much of this hypothesised marine source of sulphur contributes to the sulphur-dominated aerosol.

Previous studies in the Ross and Weddell Seas suggest that information about physical changes in the ocean can be inferred from corresponding changes in assemblages or groups of diatoms that have been placed sequentially into the sediment. Diatoms are one-celled algae that are a source of food for a wide variety of marine life.

Two scientists from the University of Maine, Drs Thomas B. and Davida E. Kellogg, will compare diatom distribution patterns they have observed

in the Weddell Sea with those in the Ross Sea. If they can demonstrate strong enough relationships between ocean conditions and diatom distribution patterns, an important new tool will have been gained for scientists studying modern and ancient ocean and environmental conditions.

BOTTOM DWELLERS

In the McMurdo Sound area scientists from the Scripps Institution of Oceanography headed by Dr Ted E. De Laca will use special cold-water diving equipment to study under the ice bottom-dwelling one-celled animals called rhizopods. Although such animals, known generically as benthic foraminifera, are abundant in many marine communities, their place in the food chain, significance in energy transfer and their effect on other organisms remain unknown.

This season the scientists will work mostly at New Harbour under 9m of ice in waters up to 30m deep. New Harbour is across McMurdo Sound from Ross Island. The McMurdo region has varied types of marine habitats with distinctive populations of rhizopods ranging from shallow water to deep ocean species.

The studies will focus on the food consumption of rhizopod populations, their density and biomass and their food value for other animals. Because these studies are year-round, the scientists will obtain information not only on the roles of rhizopods in antarctic ocean bottom communities, but also on environmental conditions and their effects on animal populations.

UPPER ATMOSPHERE

A major two-year programme in atmospheric science will be started this season when Siple Station in Ellsworth Land is reopened in

November.

Headed by Dr Robert A. Helliwell of Stanford University, scientists will investigate what happens when very-low-frequency (VLF) electromagnetic waves interact with charged particles in the magnetosphere. The objective is to improve understanding of the magnetosphere, a region controlled by the earth's magnetic field. The magnetosphere is adjacent to the ionosphere which is important in radio communications.

A 41.8km-long horizontal antenna at Siple on an 804m-high ice sheet will be reconfigured and the VLF transmitter there will be modified to allow scientists to expand their studies of wave excitation in the magnetosphere and wave-induced charged particle precipitation into the ionosphere.

Siple, originally opened in 1969 is on a flat, featureless plain near the base of the Antarctic Peninsula. Scientists selected this site because it is the best location in the Southern Hemisphere for controlled VLF wave studies of the upper atmosphere. The site is at one end of a geomagnetic line of force which passes through a region in space called the plasmopause and returns to earth in Roberval, Quebec. Scientists at Siple and Roberval record what happens to VLF radio signals generated at Siple as they travel through the plasmopause enroute to Roberval.

KATABATIC WINDS

In a cooperative project with French scientists, American scientists will try to learn more about the katabatic winds that strongly influence the climate of Antarctica and the extent of the ice pack surrounding the continent. The U.S. effort will be headed by Dr Gerd Wendler and Dr Joan P. Gosink, both of the University of Alaska.

The Katabatic winds consist of chilled, dense air spilling off the high ice cap under the influence of gravity rather than temperature or rotation. These winds are strong and steady, with velocities proportional to the slopes. They are found wherever there are large ice masses.

Three U.S. automatic weather stations have been set up between Dumont d'Urville, a French station on the Adelie Land coast, and a site known as Dome C, about 1094km inland. Data from these stations are providing a better understanding of the seasonal variation of the katabatic winds and how they are influenced by pressure systems.

WITH THE FRENCH

Working with the French, who have established weather stations in and around Dumont d'Urville, the U.S. team will use kites and balloons to make measurements in the lower atmosphere and estimate the net heat flow at three sites. The U.S. team will occupy one station about 96.5km from the coast while French observers conduct similar experiments at two other sites, one 19km from the coast and the other 193km inland.

Although scientists have studied the geological history of the dry valleys of Southern Victoria Land there have been few studies of the nature and rate of physical and chemical processes in the region. Arizona State University geologists last summer established test sites to examine wind erosion, desert-pavement formation, chemical and physical modification of rock materials and the relationship of these processes to landform development.

Dr Michael C. Malin will head a research team to obtain information for various time scales, beginning with two months and continuing up to 40 years. The team will visit 10 test sites

to collect samples and document the test materials. The samples will be analysed using a number of scientific techniques including x-ray diffraction, optical inspection, mineralogical analysis and scanning electron microscopy. The information should help in understanding how these valleys are changing and how to predict the evolution of the region.

On Ross Island geologists from the University of Alaska led by Dr Juergen Kiele will use seismic data to try to define the geometry and eruptive behaviour of the magma (molten rock) body that feeds the lava lake in the active crater of Mt. Erebus. The geologists will also study the general

activity of the Ross Island region.

Discovered in 1972 the lake is the world's only persistent lava lake accessible for study. It gradually increased in size during the next four years, and has remained fairly constant in size since 1976.

A U.S.-Japan-New Zealand project has used a seismological network since 1980 to acquire data. This summer the network's 10 permanent seismic stations will be serviced. The network helps to locate precisely micro-earthquakes in order to define active areas of Ross Island volcanos. It also enables scientists to monitor long-term seismic energy release and fluctuations.

Veteran tanker Maumee ends service

Early next year a new tanker will begin the transport of aviation and diesel fuel for United States stations, aircraft, and ships in Antarctica. After 29 years' service and 15 voyages south since the 1969-70 season the USNS Maumee has been scrapped. Her replacement is the Paul Buck, which has been in service since February this year.

One of five tankers being laid down to replace the Maumee class (Maumee, Shoshone, Yukon), the 30,000-tonne Paul Buck is 187m long and 27m wide, and carries a crew of 23. She is operated by the Trinidad Corporation and has a cargo capacity of 7,852,500 gallons of fuel. By the end of this year two more of the five tankers (Potomac and American Explorer) are expected to be in service. The fourth and fifth will be completed next year.

On her first voyage south the Paul Buck, which also carries fuel for Scott Base, is expected to discharge her cargo at McMurdo Station between January 14 and 20. She will depart on January 25 and should

arrive at Lyttelton on February 1, sailing the next day.

Launched early in 1956 the Maumee had a cargo capacity of 7,092,238 gallons. In 1969 she and the Yukon were given ice-strengthened bows to fit them for Antarctic supply work. The Maumee began her regular voyages to McMurdo Station in the 1969-70 season and maintained the service without a break until the 1981-82 season when the Yukon replaced her for one voyage.

Although she was escorted in and out of McMurdo Station to the edge of the summer pack ice the Maumee did not leave the Ross Sea without scars. In 1976 when she was 390nm north of McMurdo Sound she met heavy pack ice on January 22. A 2.4m gash was cut in her bow at the waterline and increased to 6m when she attempted to continue.

After the Coast Guard icebreaker Burton Island reached the Maumee on January 23 she was able to proceed slowly towards McMurdo Sound. Ice conditions were still difficult at Cape Bird and Beaufort Island but

the tanker berthed finally in Winter Quarters Bay on January 25.

When the Maumee left on January 29 after discharging 4.25 million gallons of fuel the Burton Island had to escort her through the ice-choked channel in McMurdo Sound to open water. Difficult ice was encountered again near Cape Bird.

To ease pressure on her damaged bow the Maumee proceeded to Lyttelton at the reduced speed of 10.4

knots but averaged only eight knots, and for long periods was stopped altogether in extremely heavy pack ice. Temporary repairs were made when the ship reached Lyttelton on February 10. Shipwrights repaired holes in her deep tanks and No. 1 cargo tank. After bunkering she sailed with the gaping hole in her bow and continued to Panama at slightly more than 10 knots instead of her usual 17 knots plus.

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the drop zone at 305m but was forced to return to New Zealand with its cargo.

Mail and fresh food, particularly fruit, were high on the priority list for the men and women who had been waiting more than four months for the air drop. Water melons, avocados, and lettuces were on the list for 17 men and two women at the South Pole. Appropriately, 11 New Zealanders enjoyed their kiwi-fruit but some plums and fresh yoghurt were squashed when the cargo bundles were dropped to the ice from 305m. The plums were not wasted; they were turned into red wine.

There were some unusual items in the Scott Base consignment — a miniature lawn mower, real dried grass, cold fish and chips, a cake containing a saw and file, pickled onions, a swede turnip, and a can of haggis. These tangible reminders of home came from families and friends in response to radio telephone requests during the winter, and occupied little space in the bundles.

On the first flight the Starlifter dropped 20.5 tonnes of mail, fresh food, and general cargo in 65 containers to McMurdo and Pole Stations. This included 509.8 kg of mail and

941 kg of food for the 17 men and two women at the Pole. The 19 bundles dropped through the side doors of the Starlifter also contained 3.52 tonnes of spare parts and other equipment.

With a winter population of 82 men and three women McMurdo Station received 155 kg of mail and 15.4 tonnes of fresh food and supplies on the first drop which was made at 11.45 a.m. when the temperature was minus 37deg Celsius. Scott Base received 46.2 kg of mail and 602 kg of general cargo.

After a break on June 24 the operation was completed the next day when the Starlifter dropped 80 bundles of mail, fresh food, and general cargo at McMurdo Station. Twelve of the bundles contained 190.5 kg of mail and 2.25 tonnes of cargo for Scott Base. McMurdo Station received 784 kg of fresh food, 1.55 tonnes of mail, and 24.11 tonnes of cargo.

Altogether the two air drops provided 115 men and women on Ross Island and at the South Pole with 2.49 tonnes of fresh food and 2.45 tonnes of mail as well as supplies and equipment needed to maintain the bases until the last winter flights in the third week of August. Support for the operation was given by men and women from the United States

Navy, Army, and Air Force, the New Zealand Army, Royal New

Zealand Air Force, and the Antarctic Division, DSIR.

Sub-Antarctic

Mercy mission to Marion Island

South African Air Force Hercules aircraft and the South African Navy's hydrographic survey ship Protea took part in a mercy mission last winter to pick up the leader of the weather team on sub-Antarctic Marion Island who was seriously ill with meningitis. Since then, the Protea which steamed at high speed from Cape Town to pick up Mr Graham Clarke, has been presented with the South African Sword of Peace awarded annually for services of the highest humanitarian order.

In June last year while the South African research and relief ship Agulhas was out of commission a call for medical aid for Mr Clarke came from Marion Island (46deg 54min S/37deg 45min E) which is 1241 nautical miles south-east of Cape Town. South Africa has

maintained a permanent meteorological station on the island for many years.

A SAAF Hercules dropped medical supplies to the station on July 11 after another Hercules was forced to turn back with engine trouble when only an hour away from the island. Then the Protea made a mercy dash to the island, and Mr Clarke, who was the team leader and medical orderly, was taken off by the ship's Wasp helicopter.

It took three attempts to transfer Mr Clarke in sub-zero weather. He was brought back safely on July 17 to the Simonstown naval base near Cape Town. This was the fourth mercy mission in five years to rescue sick or injured men at remote South African weather stations in Antarctica and the sub-Antarctic.

University expedition to Snares

Crested penguin colonies on the sub-Antarctic Snares Islands about 209km south-west of Bluff appear to be increasing rapidly. Studies by University of Canterbury scientists have shown a massive increase in the number of chicks hatched each season - 18,800 last season, 10,000 in 1982-83, and 5,880 in 1968-69.

This summer a party of five led by Mr Peter Johns, a senior lecturer in zoology, will travel to the Snares 100km from Stewart Island by fishing boat at the end of November. The expedition, financed by a grant of \$9,380 from the Lands and Survey

Department will study the New Zealand snipe as well as the crested penguin. It will also continue surveillance of the main island to check that no rats or mice reach it from fishing boats.

Mr Johns will return from the islands in January and his place will be taken by Professor George Knox, who plans to complete marine studies he began in 1961 and 1967 on the Snares and on Auckland, Campbell and Antipodes Islands. The party will return in late February.

Mr Colin Miskelly, who will be on his fourth visit to the Snares, is com-

pleting a Ph.D. on the biology and breeding behaviour of the New Zealand Snipe, which is confined to only a few subantarctic islands. He will be comparing his findings with studies of snipe found in other countries.

Two Canterbury students, Lillias Brown and Richard de Hamel, will be joined by an Otago student, Peter Tennyson, to assist in the study of penguin colonies on the island.

They will be investigating how new

breeding pairs establish nest sites in the colonies and the survival rate of juvenile penguins – of 130 banded in 1982-83, only two survivors are known. Lillias Brown will also investigate the effect of the breeding colonies on the vegetation and its recovery when colonies move.

Mr Johns, who will be on his fifth visit to the Snares, will also undertake maintenance work on the university huts, the first of which were established in 1961.

Minke whale assessment cruise

Twelve scientists from Argentina, Japan, the Soviet Union, Great Britain and the United States are participating in the 1985/86 minke whale assessment cruise.

Conducted within the auspices of the International Whaling Commission the cruise is part of the work of the International Decade of Cetacean Research being carried out south of eastern Australia and New Zealand and into the Ross Sea.

The four vessels, the Russian *Vyderzhannyi*; Japanese *Kayo Maru* No. 27, *Shonan Maru* and *Shonan Maru* No. 2 left Wellington on December 16 and are due to return in late February. Three previous cruises have used Wellington as a home port.

This is the eighth annual study and the second conducted in the Antarctic area V (130deg East to 170deg West). It aims to provide improved population estimates of minke and other whales in Antarctic waters. The minke is of prime interest as it is still being taken in Antarctic whaling operations.

The study will consist of a systematic sightings survey coupled with experiments to quantify some

of the survey methods. This will include a study coordinated with the US icebreaker *Polar Star* to determine if there are any behavioural responses by minke whales to the research vessels which could affect the survey results. There will be no marking of minke whales as has been the practice in some of the previous cruises.

Cruise leader for this years programme is Mr Gerald Joyce of Seattle Washington, USA who will coordinate all research activities.

Other members of the research team are F. Kasamatsu, K. Kawaura, S. Nishiwaki and Shigemune from Japan; R. Rowlett, B. Troutman, L. Tsunoda and K. Balcolm from the USA; J. Mermoz from Argentina; A. Ward from Great Britain. The Soviet researcher's name was not available at time of publication. A New Zealand observer Paul Ensor of Christchurch was not able to make the voyage. He was on board the *Nella Dan* under charter to the Australian Antarctic programme and trapped in ice off Cape Ann, north of Amundsen Bay in the region of Enderby Land.

This section of the cruise has been co-ordinated by Mr Martin Cawthorn from the New Zealand's Ministry of

Agriculture and Fisheries Research Division in Wellington. Dr Ray Campbell, Secretary of the International Whaling Commission Cambridge U.K. and Dr Seiji Ohsumi of Japan Fisheries Agency, Shimizu are the

international co-ordinators.

Results of the cruise will be presented at the May 1986 meeting in England of the Scientific committee of the international Whaling Commission.

Greenpeace

Plans for Ross Island

Greenpeace, the international conservation organisation, has sent an expedition to Antarctica in December aboard an 887-tonne converted ocean-going tug named Greenpeace. It plans to establish a permanent base in the Ross Island area of the Ross Dependency and maintain it for two years. Four men, a scientist, a doctor, a mechanic, and a radio operator, will occupy the base next year, and will be replaced by a second team in 1987.

Present plans are for the expedition of 35, including winter and summer parties, officers and crew, and supernumeraries, to sail from Sydney on December 15 for Hobart, take on more fuel, and sail direct to the south-west area of the Ross Sea. Earlier plans for a visit to the French Dumont d'Urville Station on the coast of Adelie Land, and a prolonged voyage to the Antarctic Peninsula appear to have been shelved because the ship's higher fuel consumption has meant that its range is less than expected. Because of the heavy load carried on the present voyage it is not possible to take on enough fuel for a visit to Dumont d'Urville and still have adequate reserves.

If conditions are too severe and the ice in the Ross Sea is too thick for the Greenpeace, Peter Wilkinson, director of the Antarctic campaign, says Greenpeace International will not

establish the base. Provided all goes well the Greenpeace should reach McMurdo Sound in the second week of January. Selection of a base site and its construction are expected to take until the first week of February. The summer team plans to return to New Zealand early in March.

No details of where the ship would go or where the base would be sited were given in the early stages of the campaign. Planning was interrupted when the Greenpeace, then named Gondwana, had to be diverted to Mururoa to support smaller ships in the Greenpeace International protest against French nuclear testing. The ship replaced the Rainbow Warrior which was sunk by the French in Auckland Harbour on July 10.

Some recent Greenpeace statements have indicated that the base would be in the south-west Ross Sea area. Now Greenpeace says the base will

Greenpeace abandoned its attempt to land a winter team on Ross Island on the evening of January 21. It was then 2.6 nm from Cape Bird. The ship retreated and by the next day was 21.5 nm to the north. Helicopters from Greenpeace had been used for ice reconnaissance. The expedition planned to remain in the area for a further two weeks before returning to Auckland where equipment will be stored for use in a further expedition next summer.

be on Ross Island near the United States McMurdo Station or New Zealand's Scott Base. It has five sites in mind but the final choice will not be made until helicopter reconnaissance report and an environmental impact report by the winter team have been studied. Construction is expected to take about three weeks.

WINTER TEAM

Two Englishmen, a West German, and an Australian will occupy the base next winter. The leader and mechanic is a 28 year-old Falkland Islander, Gerard Johnson, who spent seven summers with the British Antarctic Survey aboard the Royal Research Ship Bransfield, wintered at Halley in 1983, and took part in the building of the new station.

A 28-year-old graduate of the Philipps University of Marburg, West Germany, Ralph John, is the expedition's main scientist. He has studied corals on a previous expedition to the Red Sea. Dr Christopher Mayers, more recently senior partner in a general practice in Devon, will carry out a scientific project in addition to his medical duties. He is 53, has worked in the Canadian sub-Arctic, and was a crew member in the 1981-82 round the world yacht race.

Australia is represented in the winter team by 21-year-old Ian Balmer. He is a qualified radio technician who trained at the Australian Maritime College and was a trainee broadcasting engineer with the Australian Broadcasting Corporation before joining Greenpeace.

Gerard Johnson and his team will live and work during the winter in a prefabricated insulated plywood building 13.75m x 6.25m. A second building 5m x 2.5m will house the generating plant. Both will be en-

closed in an outer shell 22m x 7m x 5m to provide better insulation, particularly from wind noise. The base buildings were made by a Hamburg firm, Christiani and Nielsen, which provides support services for the West German programme, and was concerned in the construction of the permanent station, Georg von Neumayer on the Weddell Sea Coast.

Two scientific projects will be carried out by the winter team during its stay in Antarctica. Ralph John will initiate studies on the coastal fish fauna of the western Ross Sea. The aim is to provide baseline data throughout a whole year's cycle of the coastal fish fauna of the waters close to the Greenpeace base. Information about the feeding habits and diets of fish fauna of the Ross Sea for a whole year is scarce.

Dr Mayers, who is a pathologist, will make a study of heat loss from the head. This will follow work done by Dr C.J.H. Johnson, of Aberdeen University, on hand microclimate at an Antarctic base. Infra-red thermography has shown the head to be an important source of heat loss from the body in Antarctica. Dr Mayers will examine the head's heat loss, both bare and covered, using wind speed and other meteorological observations, and measurements close to the head, and temperature changes in and around it.

For work around the base and in the field the expedition will leave behind a Muskeg tractor with two cargo sledges and a rubber-tired trailer, a new Bombardier Alpine skideo (motor toboggan), and a Nansen sledge for field travel. The large cargo sledges and the trailer were made to haul large components to the base site from the ship. A landing craft with two outboard motors and a cargo capacity of five tonnes has been acquired in case

equipment cannot be unloaded directly onto the sea ice, but it will be brought back.

KEY FIGURES

Key figures in the Greenpeace expedition are the campaign director, and the logistics organiser. Peter Wilkinson, who is 38, is one of the five international directors of Greenpeace International and has had extensive experience as an organiser of many Greenpeace campaigns in Britain and other countries. The logistics organiser 28-year-old Andrew Hill, who has spent two years at Halley for the BAS as a meteorologist has had to leave the expedition for personal reasons.

Greenpeace has been able to call on other men with Antarctic experience for its support team. A 34-year old builder, John Fleming, spent two years at the BAS base on Signy Island in the South Orkneys, and was in charge of its rebuilding in 1980-81. He was jointly in charge of the building of the new Halley station, and deputy base commander in the 1983 winter.

A 28-year-old Australian radio technician, Peter Norris-Smith, has been concerned with the organisation and acquisition of the expedition's radio equipment. He worked for Australian National Antarctic Research Expeditions (ANARE) as a radio technician at Casey Station between 1983 and 1985.

Ship's electrical engineer on the Greenpeace is 34-year-old Dermot Hopkins. He first went south to Grytviken, South Georgia, in 1980-81 after more than eight years' with the Merchant Marine as an electrical engineer, and returned in 1983 as base generator mechanic/electrician at Halley.

Captain David Walley, who comes

from Aberdeen, will fly the expedition's Hughes 300 helicopter but not from the ship. It will be used first in Antarctica, mainly as a filming platform for the documentary to be made by Axel Engstfeld. Captain Walley trained in the Royal Air Force, has been a helicopter pilot for the last three years with a British firm, and has logged more than 3500 hours commercially, some of them on oil rig support in the North Sea, South-East Asia, and Saudi Arabia. His mechanic is Warren Chmura, a United States citizen who lives in Britain.

A well-known British film-maker, Edwin Mickleburgh, who was a BAS meteorologist for two years on Signy Island, and has been back to Antarctica several times to make films, is the expedition's still photographer. He will produce a book to go with the documentary film.

SHIP'S HISTORY

Master of the Greenpeace is Captain Peter Bouquet. Most of the crew have served in the Merchant Marines. Some others have had experience with the Swedish, South African, and the United States Merchant Marines.

A 58m steel ship, she was built at a Dutch shipyard as the Elbe in 1959 and classified as an ocean-going tug. This classification was dropped in 1977 when she was converted to a pilot boat in Cork, Ireland.

Later the tug was re-registered as a privately-owned vessel and used by the Association of Maryland pilots for pilot duties off Baltimore. She was acquired by Greenpeace in April this year for the Antarctic expedition and sailed briefly as the Gondwana before being renamed the Greenpeace.

Greenpeace International has organised its expedition at a cost of more than NZ\$1.7 million.

One of the principal functions

of the Greenpeace expedition is not only to increase public awareness of Antarctic issues but also to ensure that its activities down south become as widely known as possible. Therefore it has acquired a marine satellite communications system and arranged with a United States TV network to report regularly on the expedition.

When the Greenpeace reaches McMurdo Sound a site will be chosen near the base for the installation of the satellite communications system dish, and a high frequency radio aerial. The satellite system will operate

through the international marine satellite INMARSAT and provide voice quality telecommunications through the telephone network.

Most of the commercial traffic will be sent via INMARSAT. HF equipment will be used for emergency support and for communications with the ship and other Antarctic stations. VHF radio will be used for local communications between the base, vehicles, and the helicopter. The ship's position for communication next year will be approximately 77deg S/167deg E.

Australian yacht sails south

Barry Lewis, son of Dr David Lewis, who made the first single-handed voyage to Antarctica in the southern summers of 1972-73 and 1973-74, will sail a yacht into the Ross Sea this summer on a three-month voyage. He plans to leave Sydney at noon on January 8, first for the Bay of Whales, and then to McMurdo Sound where he and his crew of four hope to visit Shackleton's hut at Cape Royds, Ross Island.

In the week before departure satellite ice reports were not encouraging. The pack ice extended from 72 deg S to 65 deg S — a distance of 420 nautical miles. At 177 deg E/65 deg S, about 173nm to 260nm east of Cape Adare, where Barry Lewis hoped to enter the Ross Sea, the spread of ice was 10 deg (of longitude) either way. If the ice persists the yacht will be sailed west of Cape Adare to East Antarctica along the coast of George V Land.

Riquita is a 24-tonne steel yawl with a 75 h.p. diesel auxiliary which gives her an economical cruising speed of five to six knots. She is 14.3m long with a beam of 3.5m and draws about 1.82m. Her equipment includes

radar, a marine H.F. radio, and an Avon inflatable for five people.

After taking delivery of Riquita at Southport near Brisbane the crew, Barry Lewis, Ian Smith (owner), Peter Gill, Steve Deck, and Phil Kelly, sailed her to Sydney by way of Lord Howe Island. Preparations for the Antarctic cruise began more than four months ago.

Barry Lewis, who runs a sailing and navigation company in Sydney, sailed from England to Western Pacific in 1968 aboard the 11.8m ketch Isbjorn. Later he operated the Isbjorn from Tarawa, Gilbert Islands (Kiribati) as a trading ketch. She was intended to be used by David Lewis for the solo voyage south in 1972 but was caught in heavy gales on the way to Sydney and sank in the New Hebrides (Vanuatu).

Ice Bird, a 9.75m sloop, was the replacement. After David Lewis was forced to abandon his attempt to circumnavigate the Antarctic Continent Barry offered to complete the third leg of the voyage. Early in 1974 he sailed Ice Bird back to Sydney from Cape Town, making the 6000nm passage single-handed in 86 days.

Three men who followed Scott's 1911-12 route to the South Pole reached their destination on the evening of January 11 only 70 days after departing from Williams Field on the Ross Ice Shelf at noon on November 3. But, as with Scott, there was a sad end to their achievement. Because of our late publication it has been recorded in a footnote to this story.

British team make it to Pole

Three men who have wintered at Cape Evans near Scott's hut are on the way to the South Pole. Robert Swan and Roger Mear, leaders of the Footsteps of Scott Expedition, and Gareth Wood, left their base on October 26 to follow Scott's 1911-12 route to the Pole. Hauling food and equipment on plastic sledges, and using cross-country skis, the three men plan to complete their journey of 766 nautical miles in 80 days, arriving at the Pole in the third week of January.

As Swan, Mear and Wood have no advance depots, air support or radio communication, news of their progress is not expected until they reach the head of the Beardmore Glacier where the United States has a major geological field camp with helicopter support for scientific parties. Their estimate of 40 days to cross the Ross Ice Shelf would bring them to the foot of the Beardmore about December 13.

First news of the team's progress since November 3 came from a geological party working on the Lower Beardmore. The scientists were camped at Cape Allen (83deg 33min S/171deg 00min E) when they met the three men in the second week of December. Swan, Mear and Wood told the geologists they were going well and were ahead of their time-table which provided for them to start the Beardmore ascent on December 13.

Cape Allen, named by Shackleton, is a bare rock point 2.6 nm south-east of Mt. Hope near the mouth of the Beardmore. The point forms the west side of the southern approach to The Gateway leading to the Polar

Plateau.

The time allowed to reach the head of the glacier was 12 days. Scott and Shackleton laboured for three weeks but the party can travel faster. It knows what sort of terrain to expect from photographs lent by Wally Herbert, the Englishman who led a New Zealand team down the Axel Heiberg Glacier along Amundsen's route to and from the Pole.

On the 80-day time-table the party expects to take 28 days for the final stage across the Polar Plateau to the Pole. If all goes well the journey should end at the Amundsen-Scott Pole Station about January 21/22. As the party has food to last 90 days an alternative time-table could change the dates to January 31/February 1.

Captain Giles Kershaw, who provided air support for the British Trans-globe Expedition's crossing of Antarctica, will fly the party back from the Pole in a ski-equipped Cessna 185 with modified fuel tanks for this 1460 nm round trip. The dismantled Cessna will be brought south in the Southern Quest.

Originally the two Englishmen, Swan (29) a former tree surgeon, and Mear (35) a professional mountaineering instructor, planned to make the Pole journey. In October they decided to take Gareth Wood, a 34-year-old Canadian with Arctic experience, who had been the base commander at Cape Evans since the expedition's support ship Southern Quest departed on February 22 and left five men in winter quarters.

Following tradition the Pole party was expected to begin its journey on November 1, the 74th anniversary of Scott's departure from Cape Evans. Instead the five men left Jack Hayward Base (77deg 38min S/ 166deg 38min E) built 400m along the beach from Scott's hut towards the Barne Glacier, on October 26. The first stage of 21.5nm was towards McMurdo Station, and the party camped on the McMurdo Sound sea ice between the summer runway and Williams Field, the U.S. airfield complex on the Ross Ice Shelf about 11km from McMurdo Station.

PARTY DELAYED

Bad weather delayed the Pole party's departure from Williams Field until noon (local time) on November 3. About 50 men and women, mainly Americans and a few New Zealanders said goodbye to the three men, and some accompanied them for about 400m over the ice.

For the first 43nm across the ice shelf Swan, Mear, and Wood were accompanied by two Englishmen, Dr Michael Stroud (29) medical officer at Cape Evans, and John Tolson, power engineer/radio operator and film cameraman. Like Swan and Mear both have worked with the British Antarctic Survey, Stroud at Faraday Station in 1980-81, and Tolson, a master mariner, as an officer aboard the Royal Research Ships

Bransfield and John Biscoe.

SOUTHERN QUEST

On November 10 Stroud and Tolson returned to McMurdo Sound. They reported that the three men were confident and going well across the Ice Shelf. Then they went back to their base to await the arrival of the ice-strengthened former Icelandic trawler Southern Quest. The ship will return to Cape Evans and bring the expedition back after a charter by the private Australian Project Blizzard expedition which will work on Mawson's hut at Commonwealth Bay. In addition an Austrian mountaineering team which plans to climb Mt Minto (4163m) will be landed on the North Victoria Land coast.

When the Pole party departed it left behind at Cape Evans a high frequency Clansman PRC320 back pack radio because it weighed 5kg, the equivalent of almost one week's rations for one man. Both Mear and Wood did a radio course at the British Army's School of Signals last year. It did take, however, an aircraft locator beacon for emergencies. The beacon's signal can be picked up only by aircraft. U.S. Hercules aircraft will be flying between McMurdo Station and the Pole until early February but at their normal height of 7620m they may not be sighted by the men below, particularly in bad weather.

RATION SCALE

Because of the decision to include Gareth Wood the Pole party's original daily ration scale for each man had to be revised. When the party left Williams Field it carried 160kg of food, enough for 90 days, and for a man day ration scale of 592 grammes. This amount was expected to be reduced to 108kg by the time the party began its ascent of the Beard-

more.

All the expedition's planning has been based on reaching the Pole in 80 days. If the party can cover an average 21.5nm across the Ice Shelf each day, and is not delayed, the man day scale could rise to 666 grammes, giving more food for the arduous ascent of the Beardmore.

When the Southern Quest sailed from Cape Evans the five members of the expedition made winter journeys on Ross Island and on the

McMurdo Sound sea ice to test equipment, sledging rations, and man-hauling technique. Scott's man day ration for five men from the Beardmore to the Pole was 992 grammes of biscuits, pemmican, butter, sugar, tea, and cocoa.

In contrast, after 74 years Swan, Mear, and Wood have a ration based on modern dietary knowledge unavailable to Scott. It includes meals of freeze-dried chicken, rice, and vegetables, instant soups, fortified biscuits,

Microlites

Two private expeditions to Antarctica this summer – *Footsteps of Scott and Greenpeace* – and the first visit to the continent by Lord Shackleton tested the geographical, historical, and personal knowledge of some Australian and New Zealand newspapers. One Australian newspaper said the Greenpeace expedition was heading for Commonwealth Bay, and another was emphatic that its destination was Ross Bay. Robert Swan, co-leader of the *Footsteps of Scott Expedition* became Robert Don when he began his Pole journey. After Lord Shackleton returned to New Zealand a leading newspaper told its readers that he had inspected his father's and Scott's huts at the South Pole.

* * *

A sledge built for Scott's last expedition in the Sydney harbour suburb of Greenwich emerged from obscurity late this year when the *Footsteps of Scott Expedition* was preparing an exhibition to raise funds. In 1910 Scott was in Sydney trying to raise funds for his expedition. Greenwich residents did a quick whip round to help, and part of their con-

tribution went towards a 12ft sledge built by a local carpenter. The only condition was that the sledge be returned to Greenwich as a memento after the expedition. It was recovered and in 1913 was proudly displayed at the Greenwich primary school where it remained in relative obscurity until a member of the *Footsteps of Scott Expedition* learned of its existence from the mother of a pupil.

* * *

Jack Hayward Base established at Cape Evans early this year and occupied this winter by three members of the *Footsteps of Scott Expedition*, should be due for a name change. It was named after Mr Jack Hayward, the British multi-millionaire and philanthropist, who gave the expedition more than 20,000 sterling. He is now Sir Jack Hayward, having been knighted in the New Year's Honours. Known in the Bahamas as "Union Jack" Hayward he is chairman of Grand Bahama Development Company and Freeport Commercial and Industrial Ltd. His companies established on Grand Bahama a tax-free industrial centre with luxury hotels, shopping precincts, and one of the world's largest private airports.

tables, instant soups, fortified biscuits, butter, cheese, raisins, dried bacon bars and an egg and butter mixture for breakfasts, and chocolate drinks.

First of the winter journeys from Cape Evans was in March. Mear, Wood, and Dr Stroud covered about 43nm in a journey to Cape Crozier. They made ascents of Mts Erebus, Terra

Nova, and Terror on the way to Crozier and crossed the sea ice of Windless Bight on their way back to their hut. Mear made the first winter ascent of Erebus alone in the first week of June, and some of the team went out towards Cape Crozier in mid-winter to test equipment and manhauling techniques again.

Support ship sinks minutes before . . .

Swan, Mear and Wood reached the South Pole on the evening of January 11, only 70 days after departing from Williams Field on the Ross Iceshelf at noon on November 3. But there was a sad end to their achievement.

Soon after their arrival the three men learned from the Amundsen-Scott South Pole station that a message had been received from Cape Evans. Their support ship Southern Quest had been caught in pack ice 3.7 nm east of Beaufort Island (76° 65 min S/167° 13 min E) and sank shortly after midnight on January 12.

Two helicopters from the United States Coast Guard icebreaker Polar Star rescued the 18 men, including six Austrian Mountaineers, and four women from the sea ice after they had abandoned ship and flew them first to Beaufort Island and then to Cape Bird on Ross Island. From there U.S. Navy helicopters ferried them to McMurdo Station early in the morning of January 12.

Having pushed her way through 200 nautical miles of loose pack ice the Southern Quest had reached open water by January 8 and used a large ice floe off Beaufort Island to off-load a ski-equipped Cessna 185 chartered to bring Swan, Mear and Wood back to the expedition's Jack Hayward Base at Cape Evans. The Cessna had been assembled and was

ready to fly in the early hours of January 10.

Captain Giles Kershaw, pilot of the Cessna, and his engineer, Rick Mason, planned to ferry drums of fuel from the ice floe to Cape Evans and establish a depot in readiness for the flight to the Pole to await the arrival of Swan, Mear and Wood about January 15. But the sea ice was too rough for a runway to be marked out by the expedition's Doctor Michael Stroud and the film cameraman, Captain John Tolson. As a result the Cessna had to fly to Williams Field.

First news that the Southern Quest had been pinched between two ice floes when moving into open water came in emergency calls from Cape Evans to Scott Base and the Pole Station at 11.40 p.m. and 11.57 p.m. local time. These calls, passed on to McMurdo Station, said the Southern Quest had been holed, the engine room was flooding, the ship was listing, and the crew were abandoning her to take refuge on the sea ice. Shortly before midnight Scott Base was informed that passengers and crew were being flown to McMurdo Station.

At 5.15 p.m. on January 13 Swan, Mear and Wood arrived at McMurdo Station aboard a United States National Science Foundation ski-equipped Hercules. Two days later another Hercules flew all but three members of the expedition and the

Austrian mountaineering party, one of whom was Dutch, back to Christchurch.

Gareth Wood and two members of the support team Steve Brodie and Tim Lovejoy remained at the base camp at Cape Evans to clean up and dismantle the Cessna. Swan says a ship will be sent next summer to pick up stores, equipment, the aircraft and the men.

A charge of U.S. \$30,000 will be made by the National Science

Foundation for the transport of the members of the expedition and the Austrian mountaineers from McMurdo Station to Christchurch. Dr P. Wilkniss, director of the NSF's division of Polar Programs, says the expedition has not been charged for the cost of bringing Swan, Mear and Wood from the Pole to McMurdo Station or the rescue of the members from the Southern Quest. The bill will be sent from Washington to the expedition headquarters in London.

Shackleton's son reaches Pole 77 years after...

On January 9, 1909, Sir Ernest Shackleton reached 88deg 23min S on his attempt to stand at the South Pole. He was forced to turn back only 97 nautical miles from his goal. Almost 77 years later his son, Lord Edward Shackleton, reached the Pole on November 26 as a passenger in a United States ski-equipped Hercules aircraft.

Lord Shackleton, who was nearly 11 years old when his father died at Grytviken, South Georgia, in 1922, had never been to Antarctica before. He flew south from Christchurch to McMurdo Station on November 25 in a Royal New Zealand Air Force wheeled Hercules as a guest of the Antarctic Division, Department of

Scientific and Industrial Research. His visit followed a long-standing invitation from the division's director, Mr Bob Thomson, who accompanied him last month. Two other New Zealanders, Lord Elworthy, an old friend of Lord Shackleton, and the Minister of Defence (Mr Frank O'Flynn), were also guests of the division. Lord Elworthy, a former Chief of Staff, Royal Air Force, held the post during Lord Shackleton's term as Minister of Defence for the RAF (1964-67).

Two Eskimo in Antarctic

Two Alaskan Eskimo, Luther Leavitt and George Ahmogak, who are experts in polar survival techniques, will spend up to two weeks in Antarctica in January. They will study and report to the National Science Foundation on survival techniques used by scientists and support staff in the United States Antarctic Research Programme (USARP).

As guests of the United States National Science Foundation Lord Shackleton, Lord Elworthy, Mr O'Flynn, and Mr Peter Cresswell, O.I.C. at Scott Base, flew to the Pole in about three hours aboard one of the NSF aircraft. During the flight Lord Shackleton spent much of the time on the flight deck of the aircraft from where the navigator was able to indicate to him how far his father,

Scott and Wilson, were from the Pole when they too were forced to turn back in 1902. This point was 82deg 15min S, about 465 nautical miles from the Pole. On November 26, 1908, Ernest Shackleton recorded in his diary that he and his companions, Jameson Adams, Eric Marshall, and Frank Wild, has passed Scott's furthest south point.

What Lord Shackleton described later as "a very emotional experience" was to fly at 305m over the mighty Beardmore Glacier, gateway to the Polar Plateau and the Pole through the Transantarctic Mountains. Shackleton, Marshall, Adams, and Wild struggled up the glacier for three weeks in appalling conditions to reach the head of the glacier named by the leader after one of his backers, Sir William Beardmore. Scott followed the pioneers' route in 1911 on his way to the Pole.

REACH THE POLE

When the group reached the Amundsen-Scott South Pole Station it was given a tour of the present station's three two-storey buildings housed under a geodesic dome, and the site of the old station, replaced in 1974, and now almost completely buried under snow. Before dinner the NSF representative at the station, Dr Anton Inderbitzen, gave an historical review of man's involvement with the Pole, and the group made a tour of scientific projects in progress.

With the aid of an RNZAF Iroquois helicopter flown by Squadron Leader Brian Phillips, Lord Shackleton and his companions were able to condense more than 80 years of Antarctic exploration and research by three nations in the McMurdo Sound area into a shorter time span. They saw the historic huts on Ross Island, the modern New Zealand and United States bases, and across the sound

field parties at work in the dry valleys of the "McMurdo Oasis".

On the morning of November 27 the three men visited McMurdo Station to learn something of the NSF research programme. In the afternoon they flew to Cape Royds and Cape Evans to visit the huts built for Shackleton's first expedition and Scott's last.

MOVING EXPERIENCE

For Lord Shackleton particularly, the visit to his father's hut was another moving experience. There he and his companions went back in time to 1908 when Shackleton and 14 other men lived and worked together to prepare for the Pole journey. They were able also to see relics and other aspects of the party's daily life in winter quarters.

Scott's hut at Cape Evans did not hold the same personal memories for Lord Shackleton but its interior did recall the experiences his father shared with Scott and others in 1901-02. Waiting at the hut to meet their patron were two members of the Footsteps of Scott Expedition, Dr Michael Stroud and John Tolson, who wintered at their base nearby, and are there while the expedition's co-leaders, Robert Swan and Roger Mear, and Gareth Wood, who left Cape Evans on October 26, are attempting to retrace Scott's route to the Pole.

Dr Stroud and John Tolson were there to invite the group to have a cup of tea with them at Jack Hayward Base. After visiting Scott's hut the group walked about 400m to the expedition's hut. There the Englishmen and New Zealanders chatted and drank tea until the time came to return to Scott Base.

On November 28 Lord Shackleton, Lord Elworthy, and Mr O'Flynn were flown across McMurdo Sound to

Marble Point, up the Taylor and Beacon Valleys, and through Bull Pass. At the head of the Wright Valley the first RNZAF helicopter to operate in Antarctica landed to enable the party to watch a snowcraft and survival exercise, and meet the N.Z.-U.S. training team.

After lunch and an inspection of Vanda Station, the summer station on the continent in the Wright Valley, the party dropped in on a team of New Zealand drillers working on a joint N.Z.-U.S. seismic project 4.5km east of Lake Vanda. Equipment for the project was unloaded and the helicopter back to Scott Base, stopping at Marble Point to refuel, and returning by way of Cape Royds and Cape Evans.

A visit to McMurdo Station on the morning of November 29 marked the group's last day in Antarctica. After lunch and a briefing on United States operations by Captain David Srite, Commander, Naval Support Force, Antarctica, the group returned to Scott Base. Mr O'Flynn stayed there to meet the team of Royal New Zealand Engineers working on base

reconstruction; Lords Shackleton and Elworthy went fishing.

Two motor toboggans towing sledges took the fishermen to a fish hut on the sea ice some distance from the base. There they met an Auckland University team, studying the behaviour of Antarctic fish and their adaptation to cold, and were introduced to the joys of fishing — Antarctic-style — through a hole blasted in the sea ice.

Lord Shackleton caught two fish, and Lord Elworthy six. All were small, but the fishermen were happy, and ended a relaxing afternoon by driving the motor toboggans back to Scott Base.

Late on the evening of November 29 the group boarded an RNZAF Hercules again and flew back to Christchurch, arriving early the next morning. When he returned Lord Shackleton described New Zealand's Antarctic research programme as one of the best in the world for its size. He was impressed also by the dedication of New Zealanders working at Scott Base, on Ross Island, at Vanda Station, and in remote field camps.

ANTARCTIC BOOKSHELF



The Norwegian with Scott

Trygve Gran's Antarctic Diary 1910 – 1913

Edited by Geoffrey Hattersley-Smith. Translated by Ellen Johanne McGhie (nee Gran). Published by the National Maritime Museum, HMSO, London, 1984 165 x 250mm ISBN 0 11 290382 7 (Antarctic, September 1984, p.280)

In the introduction to this book, Geoffrey Hattersley-Smith makes the point that the main source for translation into English by Gran's daughter was her father's own book — *Fra Tjuagutt til sydpolarer* (From kid to south polar explorer) published in 1974. Apparently the original diary

kept by Gran on the expedition was not available for scrutiny. It is impossible therefore to say for certain whether the text of this English edition is a true translation of the original diary. This may explain why Griffith Taylor's comments of the prolific writing that Gran appeared

to indulge in are not reflected in this sometimes brief and impersonal record of the more than two years he spent living in the McMurdo Sound region.

This book records the thoughts and activities of a vigorous young man setting out on his first adventure into the Polar regions. Having been turned down as a member of Amundsen's party, Gran had been preparing for his own Antarctic expedition when he was offered a job as 'ski instructor' by Scott during the motor sledge trials in Norway.

Gran's diaries read more like a present day Alpine Journal account of a long mountaineering expedition rather than the sometimes unimaginative accounts published by other members of Scott's Expedition. This is perhaps not surprising as Gran was the only member of the expedition with either alpine/ski background, or living experience in the higher latitudes.

Scott's comments that Gran was idle are not discussed in this diary – despite Scott having “bawled him out” on one occasion while other members of the expedition were present. Gran does however record a lack of things to do; the days being held up by bad weather spent in the sleeping bag. Perhaps his Norwegian temperament and his ability to live with nature allowed him to actually

enjoy his stay in Antarctica.

Gran did not have much chance to carry out his specific job of teaching skiing – lack of snow at Cape Evans, bad weather, people being too busy to be taught and perhaps he did not easily adapt to the mindless grind of man – hauling day after day on the Ice Shelf.

Gran took part in a trip to Granite Harbour and the account of this reflects an enthusiasm and enjoyment of the topography in the area and of his companions, Debenham and Griffith Taylor. The interaction of Gran's felings concerning Amundsen's rivalry and success is touched but not dwelt on – another aspect of original editing, perhaps, when Gran produced his first book in 1915. (Hvor Sydliset flammer – Where the Southern lights blaze).

Gran's attitude to life in the polar regions is similar to those of the present day – heroics usually are the result of inexperience and ill-preparedness.

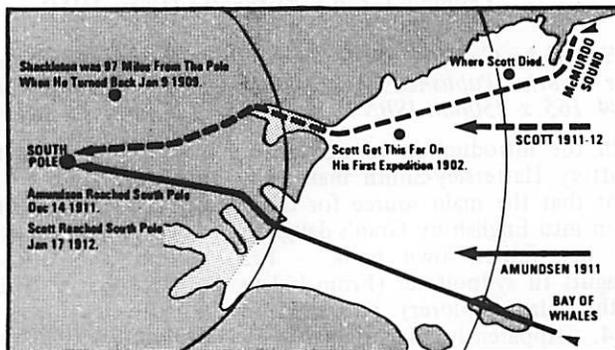
This English edition of extracts from Gran's diaries gives a new slant to the polar experiences during Scott's second expedition to McMurdo Sound. It would be very interesting to have access to the full original diaries.

– Jan and Arnold Heine

EXPLORERS and EXPLORATION

Shackleton
Amundsen
Scott
Byrd
Ellsworth
Fuchs

The routes
Amundsen
& Scott took
to reach the
South Pole ▶



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